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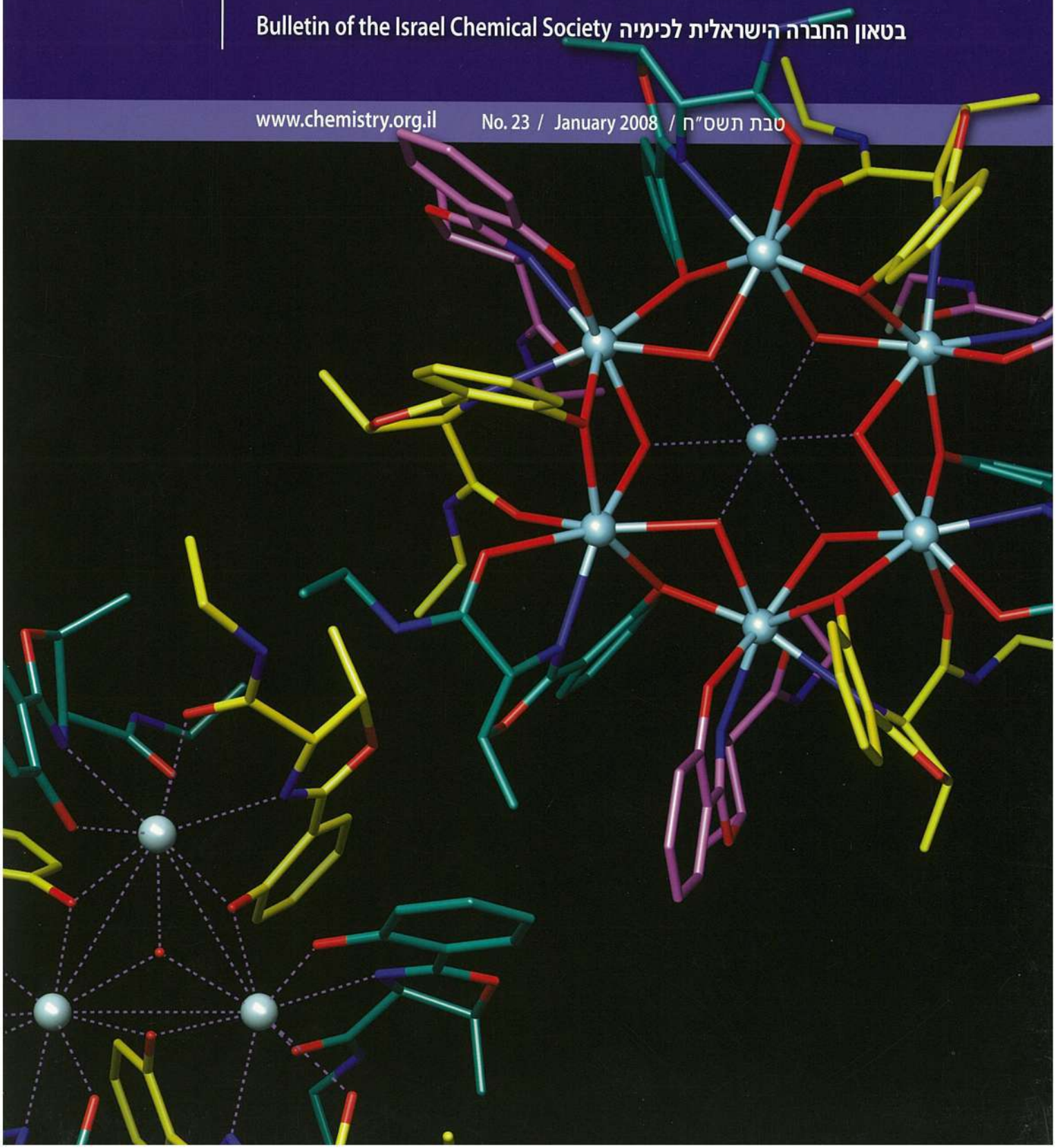

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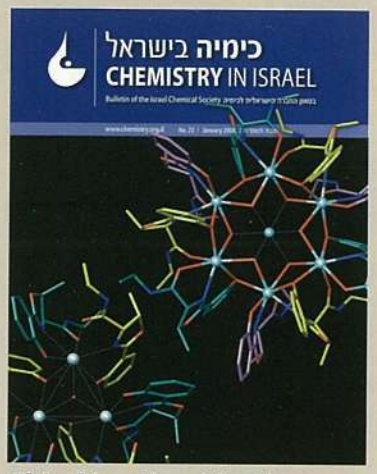

Chiral Lanthanide Clusters
Prof. Abraham Shanzer

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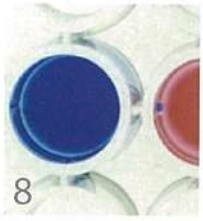

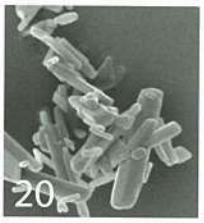

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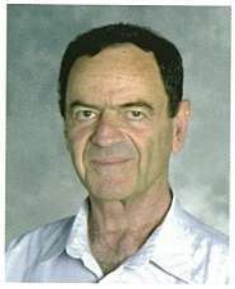

Letter from the editor

Prof. Matityahu Fridkin

Editor-in-chief

On behalf of the new editorial board it gives me a great honor and pleasure to thank **Prof. Moshe Levi** for his devoted service as the editor of Chemistry in Israel during the period 1999-2007. This contribution to the Israeli Chemical Society (ICS) was warmly acknowledged in the 72nd Annual meeting of ICS.
Prof. Levi's 80th birthday was recently celebrated in a symposium held at the Weizmann Institute. His pioneering discoveries of "living" polymers and contributions to solar energy research were highlighted in this event.

The 72nd Annual meeting of ICS took place on February 6-7, 2007, at the Hilton Hotel in Tel-Aviv. The highlights of this multidisciplinary meeting are summarized by **Prof. Gershom (Jan) Martin** who chaired the organizing committee.
The 6th congress of the Israel Association for Medicinal Chemistry (IAMC) took place on March 2007, at the Weizmann Institute. Highlights of the meeting are presented by the Organizers **Drs. Asaph Aharoni, Shai Rahimipour and Lior Zelikovich**. The IAMC became this year a new section within the ICS.

Three contributions dealing with diverse aspects related to Medicinal sciences are dedicated to this occasion: (A) Bimolecular sensing with colorimetric vesicles, by **Prof. Raz Jelinek**, (B) Fatty and based biodegradable polymers-synthesis and applications, by **Prof. Avi Domb** and (C) Supercritical fluid technology: a new route for particle design and nano-structured materials, by **Dr. Michel Perut**, from France.

The Association ("AMUTA") of Teachers in Chemistry and Sciences in Israel became in 2007 a section within the ICS. Toward this occasion **Dr. Yehoshua Sivan** one of the founders of the "AMUTA" describes (in Hebrew) some of its diverse and broad activities.

Dr. Gary Gellerman reviews the wide-scope activities at the Department of Biological Chemistry at the Ariel University Center of Samaria, including, among others: Bioorganic and Medicinal Chemistry, Bioinorganic and Inorganic Chemistry, Material Science, and Theoretical Chemistry.

Dr. Bob Weintraub, Director of the Libraries, at the Sami Shamoon College of Engineering, Beer Sheva and Ashdod, brings, from the Archives, several touching notes on the chemist and writer Primo Levi.

The ICS is a member of the European Association for Chemistry and Molecular Sciences (EuCheMS). Some recent news on the activity of EuCheMS are presented.

The dedicated, professional and creative contribution of the **Graphics Department** at the **Weizmann Institute of Science** who shaped the Graphic design, is highly appreciated.
I can not conclude without expressing my deepest thanks and appreciation to **Mrs. Anitta Harrison** for her endless efforts characterized by enthusiasm devotion and productive originality toward generation of the Bulletin. Without her contributions this issue in its present form could not be realized.

Biomolecular Sensing with Colorimetric Vesicles

Raz Jelinek* and Sofiya Kolusheva

Raz Jelinek, a Beer Sheva native, got a BSc in chemistry (summa cum Laude) from the Hebrew University in 1988. He then obtained his PhD at the University of California, Berkeley, doing solid state NMR under the supervision of Alex Pines, followed by a post-doc at the University of Pennsylvania. Since 1996 he is a faculty member at the Department of Chemistry, Ben Gurion University where he is currently an associate professor. Between 2005-2007 he has been the Department Chair, and he also chaired the 71st Meeting of the ICS at 2006.

Abstract

We describe some of our recent studies employing colorimetric vesicle-based systems for biomolecular sensing. We constructed new vesicle assemblies comprising lipids and polydiacetylene (PDA) – a chromatic polymer that undergoes blue-red transformations in response to varied biological analytes and processes. Vesicular aggregates exhibit an important advantage as a biological sensing platform in that they mimic the cell membrane – the site of molecular docking, ligand-receptor binding, and other important processes that can be exploited as means of signal generation. Particularly attractive for sensing applications is the use of colour changes visible to the naked eye or detected spectroscopically as the signal transduction mechanism. One feature of PDA that makes it a promising constituent in biosensing platforms is the rigid framework allowing incorporation of varied lipid constituents.

Introduction

Development of chemical approaches for detection and screening of biological molecules is an important and highly active field of research because of the scientific and practical significance of biosensors. Numerous bioanalytical technologies have been developed for identification and study of biological compounds [1-5]. The utilization of colour as the transduction mechanism in biosensor technologies is particularly attractive. Beside the obvious advantage of identification of colour changes with the naked eye, colorimetric transitions can be also easily recorded using conventional apparatuses such as spectrohotometers or ELISA plate readers. An additional feature of colour detection is the possibility for coupling the colorimetric

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sensor with existing optical technologies, such as optical fibers, optical signal processing, and others.

Vesicular particles have been employed in diverse applications in biological research, mostly due to their relative ease of preparation and variability in composition. In addition, vesicles are often perceived as closely mimicking the cell membrane, thus functioning as convenient biomimetic platforms. These properties have promoted the use of vesicles in biosensor assemblies. Our work has focused on developing new colour- and fluorescence-based vesicle biosensor applications. We particularly emphasize the contribution of ***chromatic polydiacetylene-based vesicles*** as a vehicle for detection and analysis of biological analytes.

Polydiacetylene-based vesicles

Conjugated polydiacetylene (PDA) is a remarkable polymeric system which exhibits unique chromatic properties. PDA is formed through 1,4 addition of aligned diacetylenic monomers, initiated by ultraviolet (uv) irradiation [6] (Figure 1). The resulting polymer is intensely blue to the eye, due to electronic delocalization within the conjugated framework, giving rise to absorption at around 650 nm in the visible region of the electromagnetic spectrum. Importantly, PDA can undergo rapid blue-red colorimetric transitions due to a variety of external perturbations, such as temperature changes [7-10], pH [11], and surface pressure [12]. The molecular mechanism corresponding to the colour change is believed to be an irreversible stress-induced structural transition of the conjugated backbone of the polymer [13,14].

The lipidomimetic structural features of PDA, i.e. hydrophobic tail (terminated by a methyl group) and hydrophilic headgroup (carboxylate) result in the formation of biomimetic membrane assemblies – such as monolayers at the air/water interface and vesicular aggregates in aqueous solutions. These organizations have facilitated utilization of the unique optical properties of PDA for varied biological sensing applications.

An important development enhancing the applicability of the colorimetric PDA technology for biological and pharmaceutical sensing systems has been the construction of *mixed lipid/PDA vesicles*, both comprising the polymer as well as phospholipids and/or other constituents of the cell membrane. The advantages of such mixed assemblies stem from the observation that the PDA framework can act as a "scaffolding" for stabilization of additional

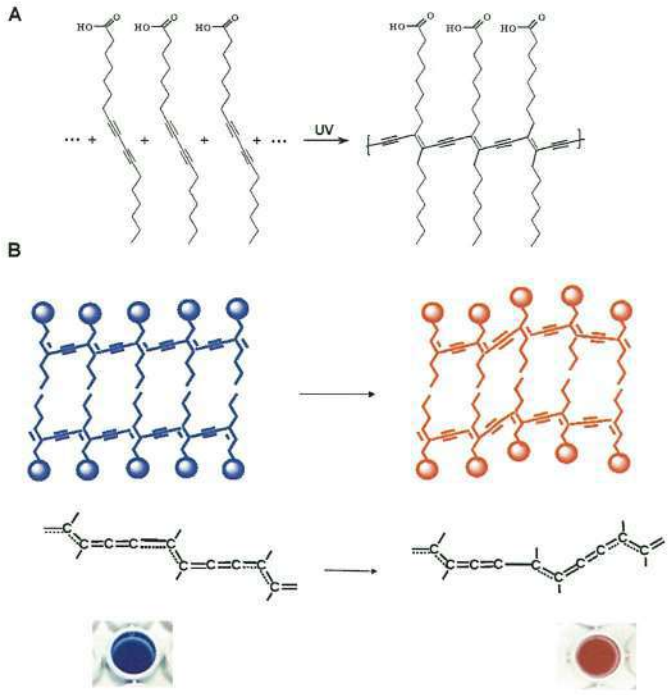

Figure 1: Structural features of polydiacetylene. A. creation of the polymerized backbone from the diynoic acid monomers; B. induction of the blue-red colour transitions.

lipophilic dyes and/or recognition elements that can be incorporated into the vesicles (rather than covalently attached to the polymer). In particular, the inclusion of additional molecular components into the vesicles creates a "modular" molecular architecture facilitating diverse biomolecular recognition capabilities, without the need to resort to often cumbersome and technically-difficult synthetic manipulation of the PDA framework.

A particularly important feature of lipid/PDA vesicle systems is the feasibility for incorporating a significant concentration of lipid constituents within the PDA matrix - up to 50% (mole ratio). This architecture is designed to better mimic the cell surface and is radically different from PDA systems containing smaller quantities of lipid "dopants", both in structure as well as functionality. Essentially, such mixed vesicles comprise distinct lipid domains embedded within the polymer framework that still retains its structural and chromatic properties [15-18]. Figure 2 depicts a schematic description of lipid/PDA vesicles. Previous studies indicated that the lipids and polydiacteylene most likely form interspersed microscopic phases within the vesicles [15]. The phospholipids incorporated within the PDA matrix adopt a bilayer structure, the dominant lipid organization

within cellular membranes. Published data further point to the contribution of changes in fluidity within the lipid domains in inducing the blue-red transitions [15,18].

The observation that the lipid components in the mixed vesicles form distinct bilayer domains is significant in the context of biosensing applications; such vesicles could then closely mimic the membrane surface of a cell. Enhancing the utilization of lipid/PDA vesicles for biological applications has been the capability of incorporating within the vesicles varied synthetic and natural phospholipids, glycolipids, lipopolysaccharides, cholesterol, or total membrane extracts, essentially mimicking the lipid compositions of different membranes and cellular systems [19].

Utilization of lipid/PDA vesicles for biosensing applications has been based upon the observation that numerous biological analytes primarily interacting with the *lipid* domains can still give rise to the blue-red transformations of the polymer. This phenomenon means that PDA in the mixed vesicles essentially constitutes a reporter module for lipophilic or membrane-active molecules. In that regard, the generic affinity of varied biological molecules, drug compounds, viruses and microorganisms to lipid assemblies could make lipid/PDA vesicles a powerful biosensing platform. In subsections below we summarize several biosensor applications of the system.

Colorimetric detection of peptide-membrane interactions

Interactions between peptides and lipid membranes play major roles in numerous physiological processes, such as signaling, formation of ion-channels, cytolysis, and cellular recognition. Furthermore, membrane permeation plays a crucial role in determining the activity of antimicrobial peptides [16]. Several reports have demonstrated that lipid/PDA vesicles undergo colour changes upon binding of antimicrobial peptides[16,20-24]. Moreover, studies have shown that important biophysical parameters, such as the degree of penetration of the peptides into lipid bilayers and mechanisms of peptide-lipid binding affect the extent and dynamics of the colorimetric transitions. Figure 3 depicts an example of colour changes induced by different peptides (at identical concentrations) in lipid/PDA vesicle solutions. The distinct colours are indicative of the purported mode of membrane interaction of the peptides: stronger interfacial association of the positively-charged beta-sheet structured *cryptdin-4* yielded a more pronounced red colour ascribed to surface perturbations induced by the peptide [23,24], while *melittin*, a helical antibacterial peptide that inserts into lipid bilayers, is expected to give rise to a more moderate colour change as indeed observed in Figure 3.

Bacterial sensing with lipid/PDA vesicles

The observation that colour changes could be induced within lipid/PDA vesicles by interactions with amphiphilic and membrane-associated molecules opens the way for other sensing applications. An intriguing recent avenue has been the utilization of lipid/PDA vesicles as a vehicle for bacterial detection [25]. In that new sensing approach, microorganisms are detected through the blue-red change induced in lipid/PDA vesicles by

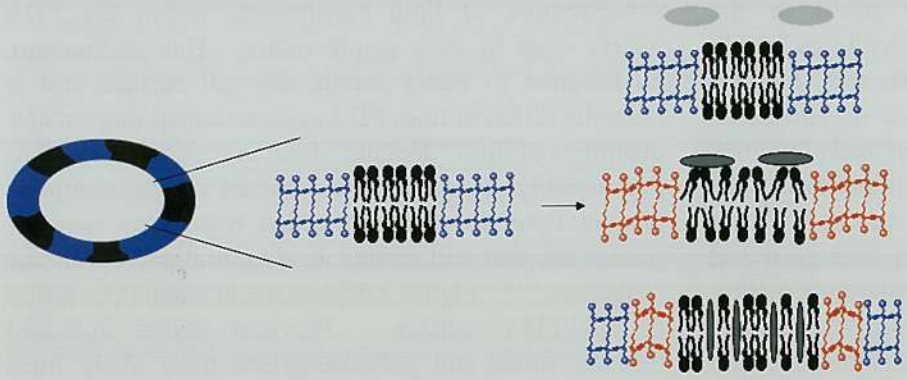

Figure 2: Colorimetric sensing with lipid/PDA vesicles. Structural/colorimetric transformations of PDA (blue) induced by molecules (grey ovals) interacting with the lipid bilayer domains (black).

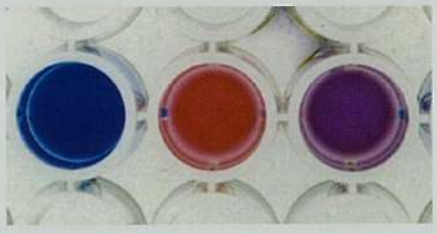

Figure 3: Colour transitions induced by membrane-associated antimicrobial peptides. Left: control vesicle solution; Center: cryptdin-4 added; Right: melittin added. Peptide concentrations were 0.1 mM.

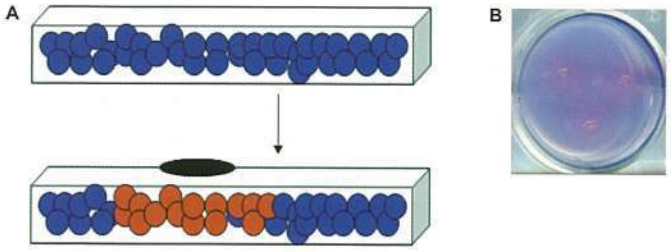

Figure 4: Bacterial sensing with lipid/PDA vesicles. A. Schematic description of the lipid/PDA vesicles (blue circles) embedded in an agar matrix (white box). Bacterial proliferation and colony formation (black oval) results in the blue-red transformation of the vesicles. B. An example of the colour transformations induced by bacterial colonies *(Salmonella typhimurium)* on a DMPC/PDA/agar plate.

the *amphiphilic and membrane-active molecules* they secrete to their environment [26-28]. Figure 4A depicts the schematic arrangement of the bacterial sensor, in which phospholipid/PDA vesicles were embedded in agar scaffolding containing bacterial-growth medium 25. The *agar matrix* serves as an amplification vehicle. It facilitates bacterial multiplication thereby promoting the release of secreted substances by the bacteria. Essentially, molecules released by bacteria that proliferate on the agar surface diffuse through the semi-porous agar substrate and induce chromatic changes in the agar-embedded vesicles, thus reporting on the bacterial presence.

Figure 4B depicts a representative scanned image of a DMPC/PDA/agar plate showing the colour transitions induced by bacteria *(S. typhimurium)*. The picture in Figure 4B clearly shows that red hallows form around the bacterial colonies following incubation (note that the apparent "doublets" in Figure 4B are due to the reflection of the scanner light). The blue-red transformation of the matrix was directly related to bacterial proliferation; each colony was surrounded by an area in which the blue agar matrix changed colour to red, while the remaining agar matrix stayed blue. The dispersion of red regions under and around the bacterial colonies indicates that the colour transitions were due to diffusion of substances released by the bacteria into the surrounding matrix.

Lipid / polydiacetylene vesicles incorporating recognition elements

Incorporation of natural and artificial receptors within lipid/PDA assemblies (Figure 5) has been a particularly important development in the utilization of the chromatic vesicles for colorimetric detection of biological analytes. The design of new systems for rapid detection of interfacial biomolecular interactions has to fulfill two main objectives. First, the chemical construct should allow physical access and binding between the receptor and the ligand in an aqueous solution. The second requirement is that the ligand/receptor interactions could be reported through easily detected chemical or physical transformations within the system. Lipid/PDA vesicles embedding recognition elements adhere to the above requirements. In such vesicles the phospholipid framework is exploited as an anchoring platform for receptors containing hydrophobic moieties, overall facilitating display of the recognition elements at the vesicle surface.

Colorimetric detection of ligand/receptor interactions through *physical incorporation* of receptors within lipid/PDA vesicles presents important advantages over chemical attachment of recognition units to the PDA itself, discussed above. First, chemical derivatization of PDA can be technically demanding, and the organic synthesis procedures limit the scope of this approach. Furthermore, attaching additional chemical units onto the diacetylene monomers often disrupts the organization and self-assembly of the monomers and adversely affects polymerization. Consequently, the abundance of recognition modules in previously-reported derivatized PDA vesicles is low [29,30]. Such limitations are generally not encountered in *lipid*/PDA vesicles incorporating recognition elements. No chemical modification of the diacetylene monomers is needed because the lipid moieties constitute the scaffolding modules for anchoring the receptor modules. In addition, a higher number of receptors can be incorporated in the vesicles because of the high mole ratio – almost 50% - of the lipids in

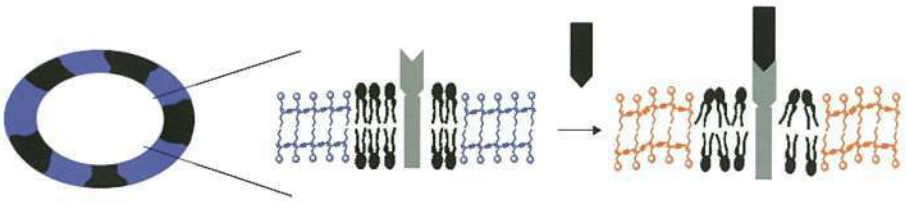

Figure 5: Colorimetric molecular recognition using lipid/PDA vesicles. Recognition elements (grey) are embedded within the lipid moieties, and the colorimetric transformations are induced following ligand/receptor binding at the vesicle surface.

the mixed lipid/PDA vesicles [18,31]. Another noteworthy feature of the lipid/PDA system as a vehicle for receptor display is the generic nature of this approach – in principle, attachment of appropriate lipophilic residues is the only precondition for displaying any receptor unit at the vesicle surface.

Incorporation of biological receptor modules in PDA-based vesicles can be combined with other scaffolding systems for creation of versatile sensing modules. For example, sol gel assemblies comprising phospholipid/polydiacetylene vesicles that further contained immunoglobulins were shown to respond to the presence of specific antigens through visible blue-red changes [31]. Below we described several sensor systems utilizing receptor/lipid/PDA vesicles for specific molecular recognition.

Protein sensors based on synthetic receptors embedded within lipid/PDA vesicles have been recently demonstrated by our laboratory [32]. Protein sensing by artificial molecules is a challenging endeavour, especially if the recognition event is desired to be coupled to a simple quantifiable readout. The innovative scheme for colorimetric determination and fingerprinting of proteins through electrostatic interactions with vesicle-embedded calixarene derivatives is depicted in Figure 6. Specifically, the hydrophobic calixarene hosts were incorporated within the lipid bilayers while their charged moieties bound soluble proteins through multivalent electrostatic interactions with charged protein surfaces [33]. Figure 6B presents uv-vis spectra of DMPC/PDA vesicle solutions, and the effect of protein/host interactions. Figure 6B shows that addition of pepsin to lipid/PDA vesicles that not containing additional receptors did not give rise to a noticeable colour transformation (the solution remained blue, Figure 6Bii) due to the fact that both pepsin (pI=1) and the PDA surface display a negative charge in the pH conditions employed in the experiment. However, adding pepsin to DMPC/PDA vesicles to which a positively-charged calixarene was pre-added gave rise to a distinct blue-to-purple colour change, clearly reflected in the visible spectrum of the solution mixture (Figure 6Biii).

The differences in colour changes induced after addition of proteins to lipid/PDA vesicles containing the calixarene hosts can be also quantified according to the %CR formula shown above. Specifically, the net *colorimetric response* (ΔCR) can be calculated for each protein and vesicle-embedded receptor [32]. ΔCR corresponds to the difference between the colour response induced by a tested protein added to lipid/PDA vesicle containing the calixarene receptor and vesicles that did not include the receptor. Interestingly, the set of ΔCR values obtained for different proteins makes possible *protein fingerprinting* (Figure 6C). Specifically, proteins can

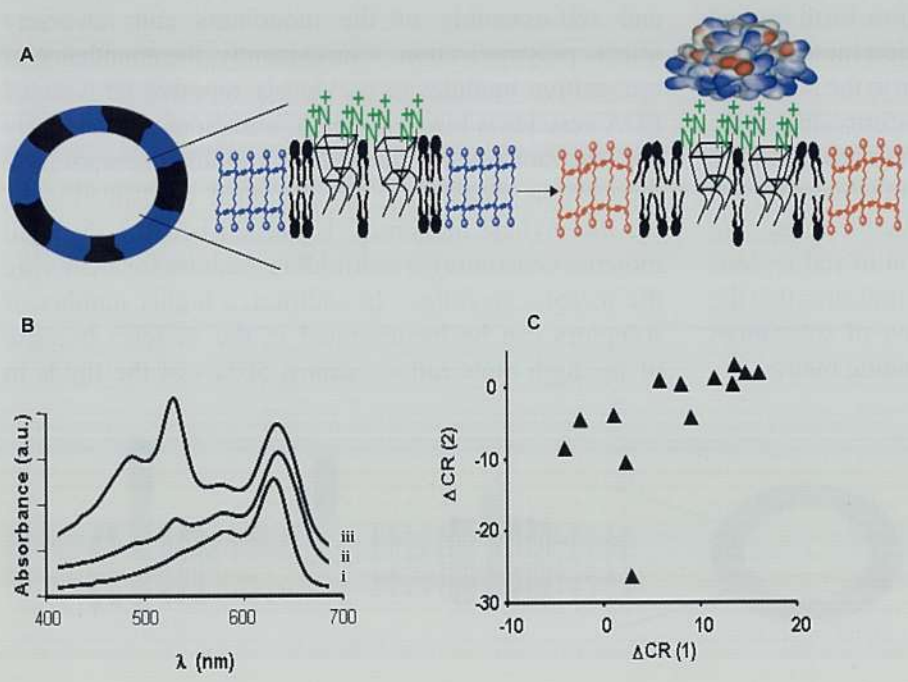

Figure 6: Protein fingerprinting by charged receptors incorporated within lipid/PDA vesicles. A. Schematic description of a lipid/PDA vesicle incorporating a synthetic host which binds a protein molecule through electrostatic attraction; B. visible spectra depicting protein sensing by the receptor/lipid/PDA vesicles: i. control vesicles (no protein added), ii. Pepsin (a negatively-charged protein, pI=1.0) added to lipid/PDA vesicles not containing the receptor, iii. Pepsin added to lipid/PDA vesicles that also incorporate a positively-charged synthetic host; C. "protein fingerprinting" – each triangle corresponds to a specific protein, x and y axes represent the changes in %CR recorded after embedding receptor **1** and receptor **2**, respectively, within the vesicles prior to protein addition [32].

be distinguished, in principle, by a *combination of net colorimetric effects* recorded by using ***different*** vesicle-embedded receptors.

The protein "fingerprinting" concept is shown in Figure 6C [32]. Each data point in the two-dimensional graph represents a protein for which ΔCR values were recorded by using calixarene **1** (x axis) or **2** (y axis). The dispersion of protein datapoints is particularly large for either acidic or basic proteins which an expected outcome since the platform relies on electrostatic interactions between the proteins and the calixarene hosts. Specifically, when *negative* proteins were added to vesicles containing the positively-charged calixarene host **1** more pronounced colour changes were recorded (positive ΔCR) due to the enhanced binding of the negative proteins to the vesicles. On the other hand, when *positive* proteins were added to lipid/PDA vesicles containing negative hosts *negative* ΔCR values were obtained – due to binding of proteins to the receptor rather than the negative PDA framework[33]. Overall, the distribution map in Figure 6C indicates that, in principle, the construction of a sufficiently broad colorimetric protein database would allow identification of proteins by combining information on their molecular weights with the colorimetric assay.

Conclusions

We presented here several biosensor platforms and applications employing chromatic PDA-based vesicles. Important features of the vesicle systems which were emphasized include their generic nature, simplicity of signal generation, recording, and analysis and diversity of biological processes and analytes that can be studied. Indeed, one of the attractive aspects many of the colorimetric vesicle systems discussed as biosensing platforms is the "one step" characteristic; generation of the colorimetric signals does not require complex procedures or initiation of a cascade of chemical reactions, but is rather a "mix and observe" process.

Acknowledgements

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Fatty acid based biodegradable polymers-synthesis and applications

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Abstract

Fatty acid incorporation in biodegradable polymers provides flexibility, low melting temperature, hydrophobicity and pliability. Most importantly it's degradation into naturally occurring compound thus environment friendly besides its utility in various medical applications like drug delivery and temporary implantable devices. Fatty acids have been incorporated in polymers where carboxylic acid groups are utilized as functional groups to incorporate the monomer in a polymer chain. Most fatty acids are monofunctional in nature and act as chain terminator in polymerization. Dimerization of unsaturated fatty acids via the unsaturation or creating a functional group on the fatty acid provides a bifunctional monomer suitable for polymerization. The most recent addition to this series is ricinoleic acid and castor oil based polyanhydrides and copolyesters. In this comprehension, the synthesis methods, physical properties, drug release characteristics, degradation, stability and toxicological aspect of fatty acid based polymers are discussed.

Introduction

Biodegradable, biocompatible polymers have gained increasing importance in drug delivery as these obviate the need of removal of biomaterial once the drug has been released [1]. Several types of biodegradable polymers which are usually classified on the basis of type of chemical linkages in the backbone have been studied it includes polyesters, polyanhydrides [2,3], polyorthoesters, polyphophazenes [4] and natural polysaccharides and polyamides. The homo- and hetero-polymers of these classes and hetero-polymers of two or more classes has given a new vista to polymer therapeutics so that the tailored

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polymer with all desirable properties can be prepared and used.

The most imperative property of any biodegradable polymer is its constituting monomers and their ratio which in turn decide upon the life of polymer in biological system, physical state, hydrophobicity, flexibility and ability to retain the encapsulated or entrapped compound. These attributes govern the end use of the polymer. Fatty acids are obtained from natural sources and these can be incorporated in biodegradable polymer chain to obtain desired property of flexibility, hydrophobicity and injectability [5-7]. Fatty acids have been used in biodegradable polyanhydrides and polyesters.

Any polymer which is used for biomedical application should be scored on the basis of the following properties to be appropriate for reasonable medical application. Thus polymer should be hydrophobic enough so that the drug is released in a predictable and controlled manner; be biocompatible when implanted in the target organ; being completely eliminated from the implantation site in predictable time; suitable physical properties for device fabrication (low melting point, usually, solubility); in case of injectable pasty polymers, the polymer should be fluid enough after drug incorporation to allow easy injection.

flexible enough before and during degradation so that it does not crumble or fragment during use; and easy to manufacture at a reasonable cost.

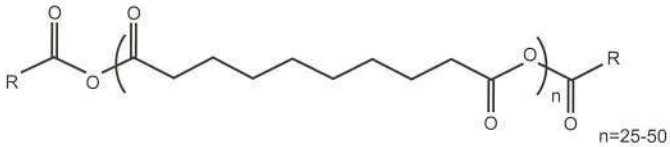
Fatty acid based polymers posses many of the above properties to claim their utility as drug delivery carriers. Fatty acids are prepared from oils and fats which consisting of saturated and unsaturated fatty acids such as castor oil, a glycerol triester of 12-hydroxyoleic acid (ricinoleic acid). Oils and fats hydrolyze into fatty acids and glycerol or fatty alcohols. This process is first done by hydrolysis of triesters and then derivatized into other forms [8].

Though the overall share of the fatty acid and its derivatives is significant in biodegradable polymers for drug delivery. Fatty acids make good choice to be included as a part of polymer chain apart from the points as discussed above is there abundance of availability.

Polyanhydrides

Incorporation of the fatty acid in the biodegradable polymer backbone is advantageous but it is restricted by monofunctionality of most naturally occurring fatty acid. Polyanhydrydes based on sebacic acid terminated with oleic, stearic, linoleic or lithocholic acid were synthesized [9]. The general structure of fatty acid terminated polyanhydrides is shown below. These polyanhydrides melt at 60-82°C and degraded to the starting acids within a few weeks. The release of 5FU continued for almost 2 weeks and of triamcinolone for 3 weeks.

Fatty acid terminated poly(sebacic anhydride)



R=Oleic, stearic, linoleic, lithocholic acids

The incorporation of fatty acids into polyanhydride backbone requires that monofunctional fatty acids be converted to dimers or add a second functional group for further polymerization. The dimer contains a branched C-C linkage which can not be metabolized by the body and the dimer remains in the body for 6 months. RA (*cis*-12-hydroxyoctadeca-9-eonoic acid) was found to be the most appropriate alternative for the synthesis of the fatty acid based polyanhydrides. It is one of the few commercially available fatty acids which have the additional 12-hydroxy group [10]. The advantage of RA is that it is a bifunctional fatty acid containing a hydroxyl group along the acid group and, therefore, can be incorporated into the polyanhydride backbone by the formation of an ester bond.

RA based polymers are the newest addition to polyanhydride series. From ricinoleic acid polyanhydride are synthesized by two different schemes. Scheme one involved conversion of ricinoleic acid to dicarboxylic acid derivative by forming a half ester with maleic anhydride or succinic anhydride which are then converted to the corresponding prepolymers. The prepolymers were then copolymerized with SA prepolymer at 150°C by usual melt-condensation method (Figure 1) [11]. Dicarboxylic acid derivative of RA, and SA are condensed at low temperature (65°C) to obtain pasty injectable low molecular weight polymers [10]. In the second scheme, RA is inserted into a preformed SA polymer chain [12]. The common physicochemical properties such as low melting point, hydrophobicity, flexibility, biocompatibility and biodegradability desired for a drug carrier possessed by these RA based polyanhydride.

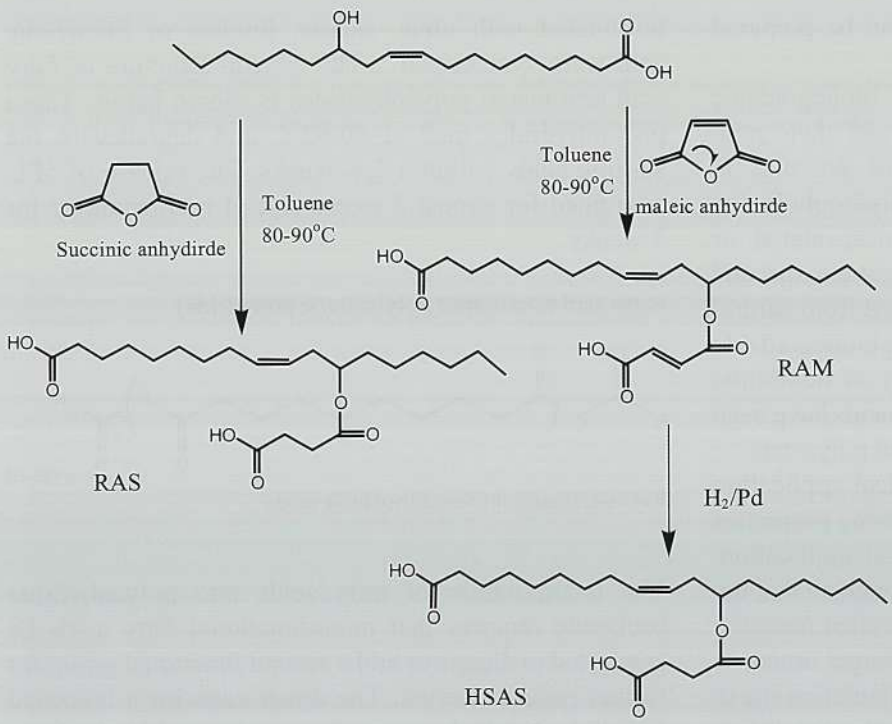


Figure 1. Synthesis of RA based polyanhydride (Scheme 1-See text)

The high molecular weight polymers synthesized were cast into rectangular MTX-loaded devices (3×5×11 mm, 300mg) for release study. The release of drug followed first order kinetics with complete release in 168 hr. MTX release was not affected by the initial molecular weight of the polymer similar to above discussed FAD based polymer. The same was also evident in the low molecular weight polymer synthesized by one pot-low temperature condensation method has given the release for around 10 days. Faster release was observed for the higher RAM containing polymers which is explained on the basis of polymer crystallnity, which hinder the release by inhibiting water penetration in the device, decreases with increase in RAM content. As the RAM content increases to 70% the polymer become liquid which solidify when added to buffer hence termed as in situ gelling injectable polymers [11].

These polymers were developed with the aim of in situ gelling injectable polymers and positive results were obtained with the polymer having more than 70% of RA content [12,13]. These were synthesized by transeterification of PSA chain with RA. It was found that upon addition of the liquid polymer to water it solidifies to form a stable semisolid. Polymers obtained by this method were loaded with cisplatin (5%) and paclitaxel (5-20%). Drug release was faster with the pasty polymers as compared to the solid polymer and the reason is same as for low molecular weight polymer. Low SA content decreases the crytallnity of the polymer and allows water penetrate the matrix, causing a faster release [10].

A complete release of cisplatin was observed in 400 hr for pasty formulation (Figure 2) [12]. Paclitaxel was released for over 100 days while the polymer carrier was being degraded [13,14]. The release rate was affected by the paclitaxel content; the higher the content, the slower was the release. The high affinity of the drug to the hydrophobic matrix and the low solubility of the drug in aqueous medium lead to the slow and controlled release of the drug from the *in situ* formed implant. As can be seen in figure 3, the drug content in the polymer affects the in vitro release of paclitaxel. As the content of paclitaxel in the polymer is higher, the formulation becomes more hydrophobic and does not allow water to penetrate and dissolve the drug and degrade the polymer.

The polymer formulations containing anti cancer agents (paclitaxel and cis-platin) were evaluated in vivo in heterotrophic (mouse bladder tumor) and orphotrophic (rat prostate cancer) models. Single administration of polymer-pactlitaxel formulation intratumorally in a mouse bladder tumor model increased the survival rate of the animals compared to untreated animals and to animals treated with paclitaxel dispersion (conventional administration method) (Figure 4) [15]. The optimal load of paclitaxel in polymer was established as 10% w/w. Mice treated with this formulation showed median survival rate (MSR) of 35 days (animals were sacrificed at the end point of the experiment) compared to 16days of untreated group and 18 days for animals treated by conventional paclitaxel suspension. 40% of mice treated with 10% paclitaxel formulation survived for 77 days. In control groups none survived more then 23 days. Treatment with polymer-paclitaxel formulation reduced the tumor size from 3.6gr (untreated animals) and 2.5gr (paclitaxel suspension) to 0.3g (10% paclitaxel formulation) [15]. Also mice treated with cis-platin formulation survived much longer compared to the control group (Figure 5).

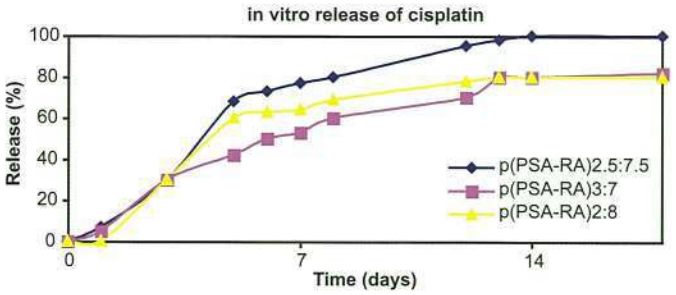


Figure 2: in vitro release of cis platin from pol(RA-SA) in phosphate buffer pH7.4 at 37˚C

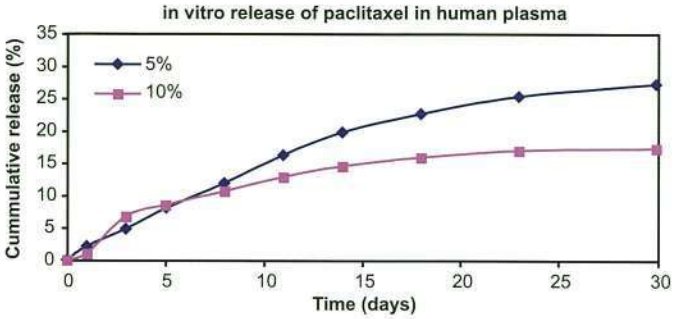


Figure 3: In vitro release of paclitaxel from poly(SA-RA)2:8 in human plasma at 37˚C

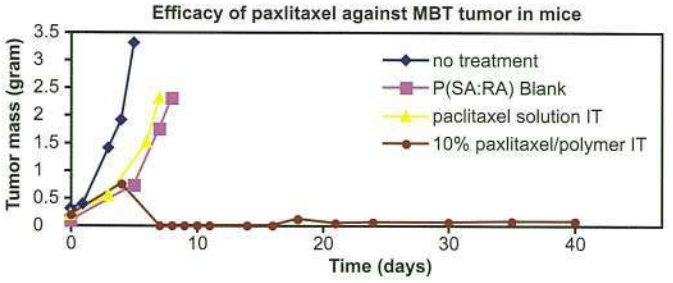


Figure 4: Efficacy of paclitaxel against MBT tumor in mice

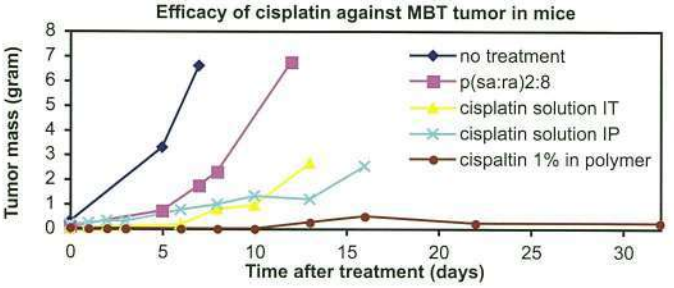


Figure 5: Efficacy of cisplatin against MBT tumor in mice

The polymer-paclitaxel formulation was also evaluated for treatment of orthotopic prostate cancer and showed effectiveness [16].

A formulation of bupivacaine loaded P(SA:RA)(2:8) injectable polymer was evaluated for the efficacy and toxicity for producing motor and sensory block when injected near the sciatic nerve [17]. Bupivacaine was dissolved in the polymer paste having in vitro drug release for 10-15 days. The efficacy and toxicity of the polymer–drug combination was determined by injecting the polymer formulation near the sciatic nerve of mice and measure the sensory and motor nerve blockade for 48 hr, while monitoring the animal general health and the injection site. Single injection of 10% bupivacaine in the polymer caused motor and sensory block that lasted at least 30 h without causing any adverse effects.

A detailed study of degradation of P(RA-SA) polymers have been carried out by Krasko et al.[20] Polymer with 50:50 ratio degraded in two months while those having >70% RA content taken more than 3 months for complete degradation. Within one week, all anhydride bonds get cleaved and SA was mostly released. The fact that not 100% SA was released during the experiment is due to SA-RA oligoesters that gradually degrade to water soluble SA or SA-RA dimers. HPLC analysis of the buffer solutions found that there was no RA release from the polymer but alkali hydrolysis given the expected amount of RA and this can be concluded that other RA containing species (RA-RA, RA-SA, RA-RA-RA, RA-RA-RA-RA) are released, rather RA monomers, to the water.

copolyesters

Some new studies have included ricinoleic acid in the polymer backbone by methods other then the described above and most of these reports are of ricinoleic acid based copolyester. One of these uses ricinoleic lactone for synthesis of copolyester by ring opening polymerization (ROP) [18,19]. Ricinoleic acid lactones were synthesized by using dicyclohexylcarbodimide and (dimethylamino)pyridine as catalyst. Mono- to haxalactones were obtained and polymerized with catalysts commonly used for ring-opening polymerization of lactones, under specific reaction conditions, resulted in oligomers. ROP of ricinoleic acid lactones is difficult even when using a highly reactive ring-opening catalyst such as tin octoate, yttrium isopropoxide, trimethylsilanolates, and (2,4-di-*tert*-butyl-6-{[(2'-dimethylaminoethyl)methylamino]- methyl} phenol)ethylzinc. Polymerization of ricinoleic acid lactones 1RM-6RM with more reactive

catalysts, yttrium isopropoxide Y(OiPr), resulted in oligomers. Polymerization of chromatography-purified 1RM (Mn=280) with Me^3SiONa resulted in short oligomers of 5 units (Mn~1400). The number of end groups (OH or COOH) that were noticed by 1H NMR is lower than it should be in the case of low molecular weight oligomers (according to 1H NMR, DP=16.5), due to reversible cyclization to lactones. Polymerization of chromatography-purified dilactone 2RM with Sn(Oct) resulted in the formation of longer oligomers (Mn=4400, Mw=5700, 15-20 unit oligomer). However, copolymerization with lactide resulted in copolymers of low molecular weight. Polymers with molecular weights in the range 5000-16000 were obtained with melting temperatures of 100-130°C for copolymers containing 10-50% w/w ricinoleic acid residues. The polymers were off-white in color that became yellow with an increase of the RA content. The molecular weights of the polymers decreased with an increase in the content of the ricinoleic acid lactone. It was hypothesized that more reactive lactide activated first by catalyst polymerizes and only in the end some ricinoleic acid lactones react. The reaction is terminated because of the ricinoleic acid lactones' low reactivity. This low reactivity can be attributed to the low ring strain and to the steric hindrance of the ester bond by the fatty acid side chain. In vitro degradation of RA-LA copolymers showed that copolymerization with RA had some effect on the degradation rate and the polymer physical properties, which is related to the low incorporation of RA in the polymer. Addition of ricinoleic acid (RA) to poly(lactic acid) (PLA) is expected to improve the hydrophobicity of the polymer and thus drug release profile.

In continuation of the above study, copolyesters were synthesized by transesterification and melt-condensation procedures (Figure 1) [19]. Liquid polymers were achieved when RA content increase more than 15% and 50% in case of melt-condensation and transesterfication, repectivley.

Polyesters synthesized by all three methods were compared for release of hydrophilic and hydrophobic drug viz. 5-FU and triamcinolone repectively. 5-FU release was faster in all cases, the total release occurred in 17 days from polymers prepared by transesterification and melt-condensation. Slower 5-FU release from polymer prepared by ROP (40% in 17 days). The same pattern was observed for triamcinolone, only 5% in 17 days from ROP polymer in contrast to the 30% from polymer synthesized by transesterfication (Figure 6). The difference was attributed to the diblock nature of ROP polymer, its high crytallinity and melting point all of which inhibit water penetration and thus degradation, which finally shows up in release profiles [19].

Additional polyesters were synthesized by the polycondensation of lactic acid and castor oil and were examined as injectable controlled delivery carriers for cytotoxic drugs (paclitaxel, methotrexate, 5FU and cis-platin).

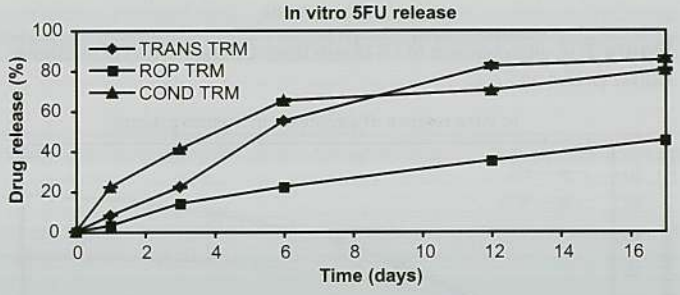
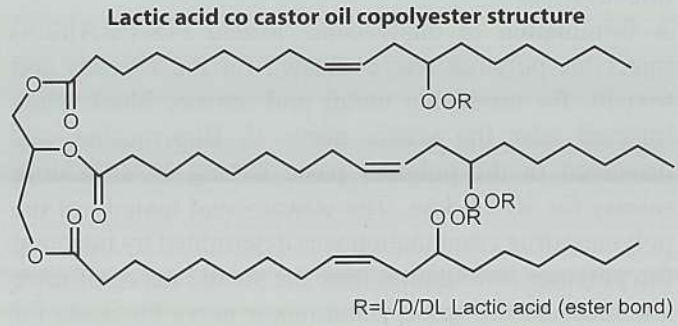


Figure 6: In vitro 5FU release from poly(RA-LA) prepared by different polymerization methods, transesterification (trans), ring opening polymerization (ROP) and by direct condensation (Cond).



Polyesters were synthesized using enantiometrically pure lactic acid (L or D) or racemic DL lactic acid. Polyesters containing 40% castor oil are viscose liquids at room temperature and released the incorporated drugs for over three months. The drug release from poly(LA-CO) and polymer degradation is shown in Figs. 7 and 8.

Summary

Inclusion of naturally occurring fatty acids in polymer chain provides useful characteristics suitable for use as implants. Fatty acid included polymer were found to retard degradation and release of incorporated agents.

First order kinetics is followed during degradation and release where the polymer contains SA as the second monomer. SA being relatively hydrophilic monomer moves out of the polymer matrix in early stages leaving behind a more hydrophobic remnant which inhibit erosion and release. Various fatty acids like stearic acid, oleic acid, myristic acid, lithocholic acid, ricinoleic acid etc. are used to terminate a performed polymer chain providing it hydrophobicity. Dimer based polymers were very successful and comes into the picture as these can be integrated in the polymer backbone. These dimer, specially EAD based polymers have been studied in full detail and resulted in a clinically used product called Septacin™ used to deliver gentamicin in osteomyelitis. The recent advancement to the fatty acid based polymers

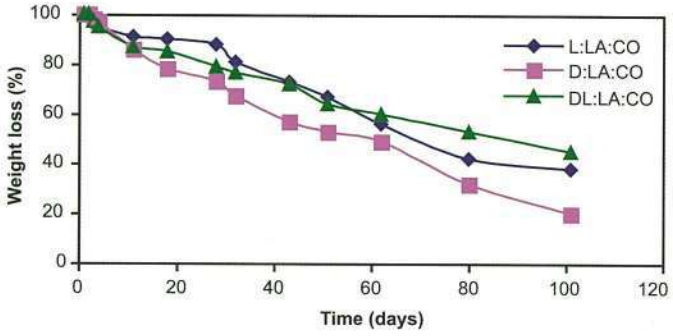


Figure 7: In vitro degradation of poly(lactic acid co castor oil) polyesters (feed ratio 6:4)

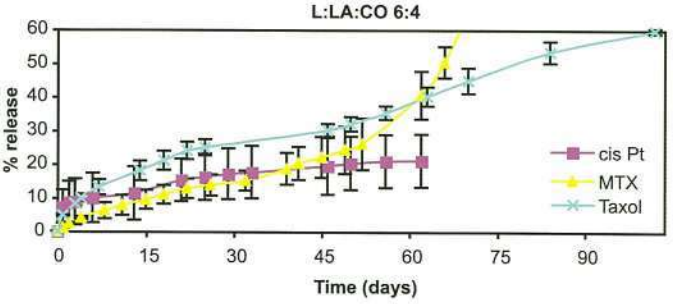


Figure 8: In vitro release of anti cancer agents from poly(L-lactide-castor oil) P(L-LA:CO) 6:4

is the use of bifunctional ricinoleic acid (RA) as monomer. Incropoartion of RA in either polyanhydride or copolyester has given wide range of biomaterial, form solid implants to in situ forming injectable gels. Thus widening the scope of these polymers from practical and clinical usability point of view. Overall these fatty acid based polymers are having remarkable prospective for used in drug delivery and other implantation purposes.

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Supercritical Fluid Technology : A new route for particle design and nano-structured materials

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Scope:

The use of supercritical fluid (SCF) solvents is a promising route to both reducing pollutant release and improving the final products quality through various innovative developments in many domains including food, pharmaceuticals, cosmetics, biomedical systems and new materials. Many different processes are available for extraction and/or purification of natural or synthetic products, nutraceutical and drug formulation, innovative synthesis routes, preparation of new materials. A major R&D effort is presently dedicated to particle design – mainly for pharmaceutical formulation and innovative inorganic or composite powders – and to nano-structured materials applicable in micro-electronic and related development.

1. Supercritical Fluid properties:

All pure compounds (except Helium 3) have a "curious" behavior at a "critical" temperature TC and a "critical" pressure PC over which no longer could co-exist a "liquid" and a "gaseous" phase, but only one phase called "supercritical" or "hypercritical". This "critical" point (TC, PC) is the end point of the vaporization curve in the T,P diagram. When only pressure is beyond PC and is T below TC, the fluid is a liquid called "subcritical". In fact, few supercritical fluids are used (essentially carbon dioxide, light alkanes, hydrofluorocarbons, and water), generally at a temperature near TC, and variable pressures between 0.5 to 5 PC in most cases.

Most applications of supercritical fluids (and subcritical liquids) are related to their "tunable" properties, particularly their solvent power, that can be easily changed by monitoring pressure and temperature. Obviously, carbon dioxide is the most attractive supercritical fluid: Very cheap and widely abundant in pure form (food grade), non flammable and not toxic (although it requires strong safety precautions), and environment-friendly. Its critical point (31°C – 74 bar), permits to operate at near-ambient temperature and "acceptable" pressure (100 to 350 bar). As CO_2 behaves as a rather weak "non-polar" solvent that selectively dissolves the lipids like fats, hydrocarbons, essential oils, but has a weak affinity with polar molecules and does not dissolve hydrophilic (sugars and proteins) and mineral (salts, metals) compounds, its solvent power and polarity can be significantly increased by adding a polar *co-solvent* like alcohols, esters or ketones, especially *ethanol*. CO_2 exhibits *biocide* properties on fungi, bacteria and viruses, so that all processed materials are decontaminated, or even sterilized. Moreover, due to its non-polar character, SCF carbon dioxide is also used as *"anti-solvent"* when dissolved in polar organic solvents, causing precipitation of compounds previously dissolved in these solvents.

Other types of fluids are also considered for specific applications:

- *Nitrous oxide (N_2O)*, very similar to CO_2, but it must be processed with great care as it may be a comburant leading to explosion when contacted with flammable solutes;
- *Light hydrocarbons,* especially propane, are strong solvents of lipids ; non toxic but flammable;
- *HydroFluoroCarbons (HFCs)*, although they are strong "green-house" gases and very expensive ;
- *Dimethyl ether*, used as liquefied gas, that behaves as a "polar" solvent able to dissolve a very wide range of compounds including many polymers; non toxic but flammable;
- *Water* exhibits very attractive properties at subcritical or supercritical conditions, with a great variation of the solvent polarity as SCF water dissolves organics and precipitate salts.

SCF transport properties are very attractive with very low viscosity and low diffusivity, leading to fast mass transfer; SCFs rapidly diffuse into porous media, easing either extraction or impregnation of solutes. Moreover, a drastic *viscosity reduction* of a liquid phase contacted with a SCF solvent - that partly dissolves in the liquid - is observed, even at a pressure below critical, causing fluidification of viscous oils and waxes, polymers "swelling" and "plasticization" with a decrease of the glass transition temperature, and permitting an easy processing of such materials (extraction, forming, atomizing, mixing, grafting, foaming, etc.).

2. Particle design and nano-structured materials:

Particle formation processes using supercritical fluids are now subjected to an acute interest in two domains:

- **Material Science**: SCFs are currently used to develop innovative **nano-structured materials** for various applications: Ultra-porous aerogels and "foams" (inorganic oxides, polymers and carbon) for thermal insulation and catalyst supports, ceramics and refractory powders, supra-conductors, micro-electronics (silicon wafer processing and surface

Table 1 : Formation of neat or composite micro-particles/materials

Substrate soluble in SCF	Matrix soluble in SCF	Available process	Type of particles produced	Remarks
Yes Yes	-- Yes	Rapid Expansion of Supercritical Solutions (RESS)	Nano/Micro-particles Micro-spheres	Few substrates/coatings are soluble in SCF CO_2
Yes	No	Impregnation	Micro-pheres/Biomaterials	Substrates must be soluble in SCF
No	Yes	Liposome-RESS	Liposomes	Not yet scaled-up
		RESS Fluidized-bed coating	Micro-capsules	Few coatings are soluble in SCF CO_2
		Coating deposition	Micro-capsules	
No	No	Anti-solvent processes	Nano/Micro-particles Micro-spheres	Huge fluid ratio Difficult scale-up
		Coating coacervation	Micro-capsules	Not yet scaled-up
		Fluid-Assisted Micro-encapsulation	Micro-capsules	Very low CO_2 consumption Easy scale-up
		CPF process	Micro-spheres	Easy scale-up
		Infusion	Biomaterials	Slow process
No	--	Emulsion drying	Nano/Micro-particles	Biological molecules
No No	-- Yes	Polar SCF drying	Nano-Micro-particles Micro-capsules	Biological molecules

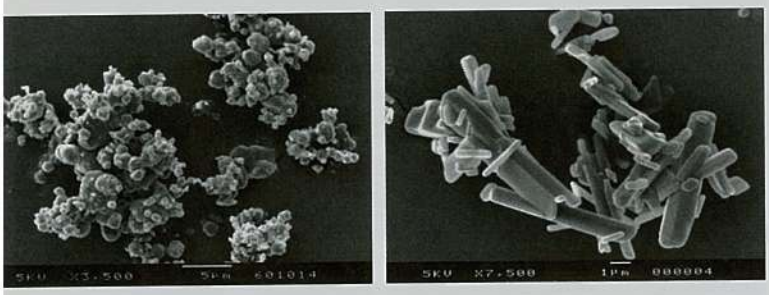


Figure 1 : Micronization of lovastatin by RESS

treatment for chips and Micro-Electro- Mechanical Systems), etc.

- **Pharmaceutical industry:** SCF processes are developed for increasing bio-availability of poorly soluble molecules, designing sustained - release formulations and preparing drug delivery less invasive than parenteral (oral, pulmonary, transdermal). The most complex challenge is related to therapeutic proteins as it is extremely difficult to process and deliver bio-molecules due to their instability and very short half-life *in vivo*. In fact, SCF technology comprises several processes to prepare various forms or formulations of the drug (dry inhalable powder, nano-particle suspension, micro-spheres or micro-capsules of drug embedded in a carrier, drug-impregnated excipient or matrix, etc.). Moreover, although most previous works dealt with water-insoluble (or poorly soluble) molecules, recent development permits to also process very hydrophilic molecules, including fragile bio-molecules.

Various processes are available, depending on the API and excipient solubility in the SCF and on the targeted particle morphology. As summarized in Table 1, it is either possible to prepare neat nano-/micro-particles or composite particles incorporating the API in a hydrophilic (or hydrophobic) carrier when an immediate API release (or a sustained release) is wished. Complexation of hydrophobic APIs in cyclodextrins can be obtained by a SCF anti-solvent process leading to controlled-size particles presenting a drastic increase of apparent solubility of the drug in water. It is noteworthy that the particle size distribution, shape (Figure 1) and crystalline morphology can be tuned in order to improve the pharmaceutical service of the API ; for example, it is possible to fit the specifications for inhalation (Figure 2). Stabilized formulation of proteins incorporating buffer salts, sugars and possibly surfactants can be obtained by SCF CO2 processing of a W/O emulsion of protein aqueous solution in a heavy alcohol; bio-activity is preserved as shown on several enzymes (catalase, trypsin, lactase) and on insulin particles (Figure 2) injected into diabetic rats.

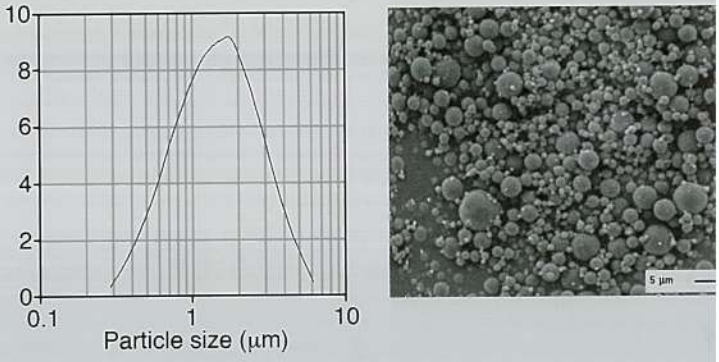


Figure 2 : Insulin particle size distribution

Future trends :

Many promising applications are now under development, especially for new drug formulations and nano-structured composite materials. Regarding *scale-up*, we do not foresee major issues for implementing most SCF processes at a scale corresponding to commercial needs for drug formulation and specialty materials. For example, SEPAREX recently designed and built equipment of several sizes: Lab-scale for screening new chemical entities or bio-molecules available in very limited amounts, pilot-scale equipment for preparing gram-samples, and several semi-industrial plants for manufacturing clinical lots that are operated in compliance to GMP rules (figure 3), and pilot-plants for inorganic powder formation that can be operated either with supercritical carbon dioxide (and co-solvents) or supercritical water.

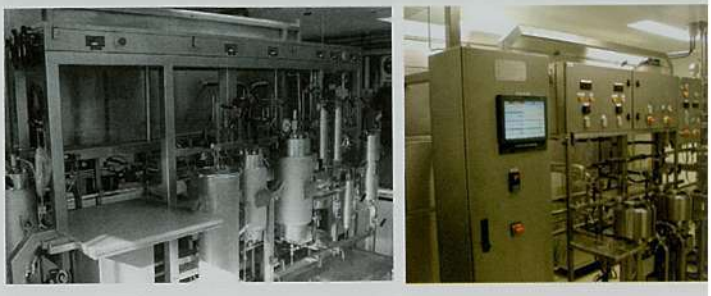
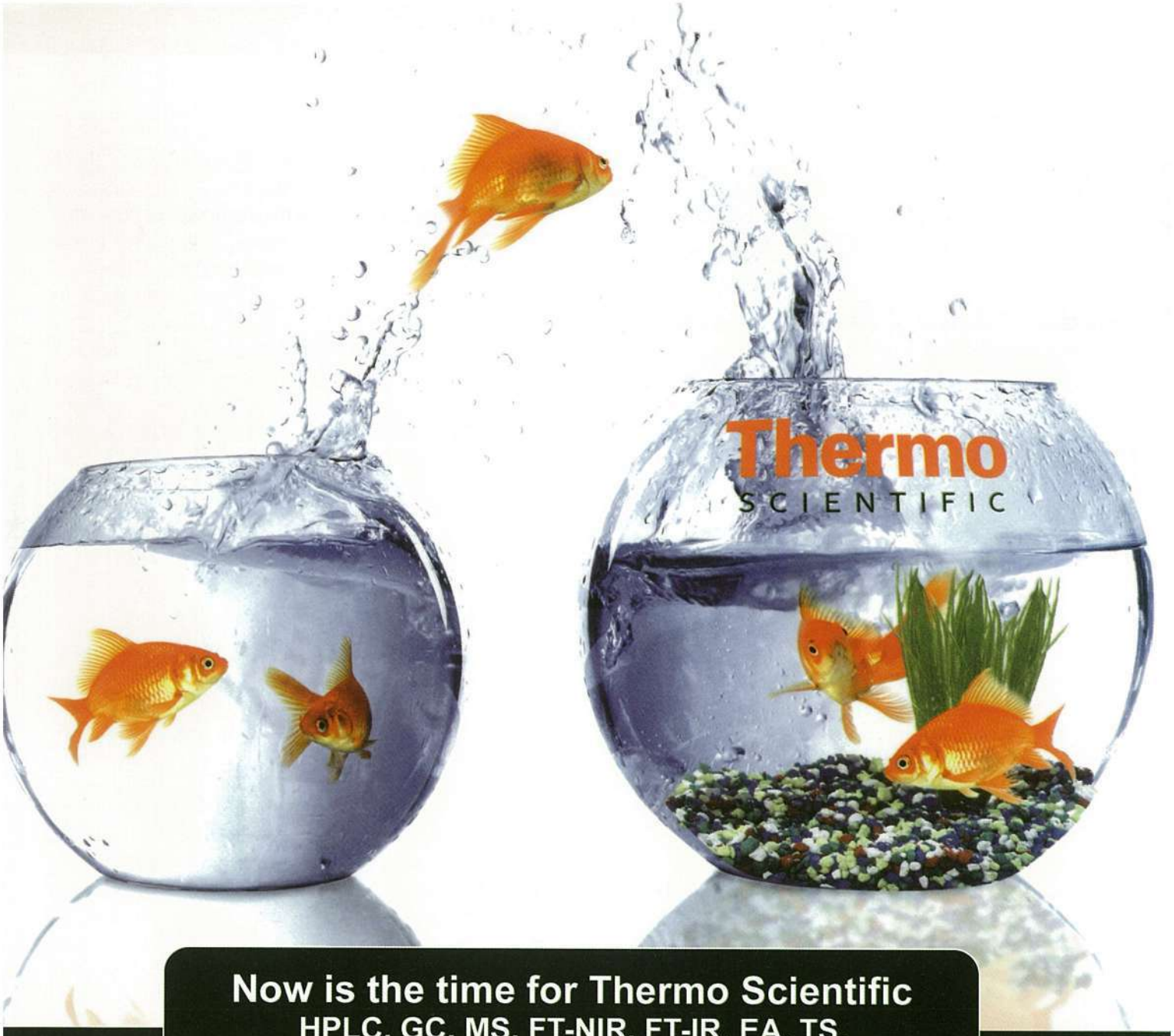


Figure 3 : SCF particle design units in compliance with GMP



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The 72nd annual meeting of the Israel Chemical Society

Prof. Gershom (Jan) Martin

The 72nd Annual Meeting of the Israel Chemical Society took place on February 6–7, 2007 at the Hilton Hotel in Tel-Aviv. By annual rotation, this year it was the turn of the Weizmann Institute's Faculty of Chemistry to organize the event. Yours truly, Gershom Martin, chaired an organizing committee consisting of Lia Addadi, Lucio Frydman, Ronny Neumann, Raphy Nudelman, Israel Rubinstein, and Reshef Tenne. Logistical conference organization was handled in a very professional way by Anat Reshef and her team at Unitours-Diesenhaus.

Attendance figures have been rising for the past 3–4 years, and the trend continued this year. Especially on the 1st day, the conference venue was filled to capacity.

For the first time in recent memory, a substantial portion (40%) of the lectures was given over to contributed lectures selected from abstracts submitted in response to a "call for papers". Response to the call for papers exceeded the organizers' expectations — two and a half times as many abstracts were received as there were available lecture slots — and as a result, a very strong ensemble of lectures could be chosen. Many of the contributed lectures were given by outstanding Ph.D. students and postdocs. Finally, a number of lectures with an especially interdisciplinary character were grouped into a "Science Mix" session.

Three plenary lectures were given by distinguished scientists from abroad: (1) by Prof. François Diederich of ETH Zürich (whose manifold research interests and achievements have molecular recognition and supramolecular chemistry as recurring themes); (2) by Dr. Ad Bax from NIH (a bio-NMR specialist who, according to the ICS Science Citation Index, was the #1 most cited chemist in the 1981–1998 time frame); (3) by Prof. Adam Heller from the University of Texas at Austin, whose TheraSense™ "artificial pancreas" technology was purchased by Abbott Medical for a ten-figure sum. (The first commercial product resulting is the FreeStyle series of near-painless glucose monitors.)

Opening ceremony. From left to right: Prof. Shlomo Margel, president, and Prof. Gershom Martin, chairman

From left to right: Dr. Michael Bendikov, Drs. Milko and Tamar van der Boom

By long-standing tradition, plenary lectures were given by the [2006] ICS Prize Laureates, Prof. David Milstein, an organometallic chemist from the Weizmann Institute, and Prof. Nimrod Moiseyev, a theoretician from the Technion. The 2006 Outstanding Young Scientist Prize winner, Dr. Milko van der Boom from Weizmann, gave the keynote lecture in the Science Mix session. (See elsewhere in this issue for articles about the various prize winners.)

Sixteen parallel sessions covered the wide variety of science in Israel. In order to promote discussion between scientists, several closely related subjects were gathered under a common umbrella: for instance, while there was no separate session on Theoretical Chemistry, there were two sessions on Physical Chemistry, with a 50:50 mix of theoreticians and experimentalists among the lecturers.

Typically, each session had one keynote lecture, two invited lectures, and two contributed lectures. Keynote lecturers from abroad included Dr. Branko Ruscic from Argonne National Laboratory (Physical Chemistry), Prof. Thomas Ebbesen from Louis Pasteur University of Strasbourg (Materials and Nano), Prof. Joachim Spatz from MPI Stuttgart and Heidelberg University (Soft Matter), Prof. Jonathan Stamler (Duke U. Medical School), and Dr. Bruce Budowle — "Mr. DNA" of the FBI (Analytical and Forensic Chemistry).

All sessions were well-attended, but the Forensic Chemistry session — another first-time experiment — was packed to the rafters: clearly there was more of a "CSI Effect" than the organizers had expected.

Some 240 posters were on display, and the poster prize committee had a very hard time coming to a decision. In the end, the IUPAC-sponsored poster prizes went to Galit Shustak from Hebrew University on the one hand, and the equally contributing team of Noam Geblinger and Ariel Ismach on the other hand.

The Chemical Education session focused primarily on the new Chemistry curriculum for Israeli high schools: however, a presentation by David Tannor of his innovative quantum mechanics textbook broke the usual mold.

A well-attended festive conference dinner in the grand Hilton style honored the ICS Prize winners, but also served as a platform for two "change of the guard" ceremonies. The longtime administrative secretary of the ICS, Ms. Bracha Granot, passed on her baton to her successor, Ms. Anitta Harrison, while Prof. Moshe Levy, editor of the ICS Bulletin for over a decade, handed over the reins to the current editor, Prof. Matityahu Fridkin. The ICS Prize winners were honored by two brief presentations each: one by a senior colleague, another by a former student.

In all, we believe that the meeting may be considered a resounding success. If one were to single out only one feature that set it apart from other meeting, it would be the active participation of graduate students and postdocs. It is our hope that the 2008 meeting, to be organized by the Hebrew University of Jerusalem, will draw an even larger crowd.

On behalf of the organizing committee,
Gershom (Jan) Martin
ICS2007 Conference Chair

From left to right: Prof. David Milstein and Prof. Shlomo Margel

From left to right: Prof. Nimrod Moiseyev and Prof. Shlomo Margel

Prof. Moshe Levy
editor-in-chief 1999-2007

The Israel Chemical Society Prizes for 2006

Excellent Scientist

Prof. David Milstein

Prof. Nimrod Moiseyev

PROF. DAVID MILSTEIN
Dept. of Organic Chemistry, Weizmann Institute of Science.
For his most important contributions to the field of organometallic chemistry, the development of new catalytic processes, and the activation of various C-X, O-H, and N-H bonds.

PROF. NIMROD MOISEYEV
Department of Chemistry, Technion-Israel Institute of Technology.
For his highly original and insightful contributions to theoretical Chemistry, to resonance theory and its applications to phenomena in molecules, for the development of non-Hermetian quantum mechanics and a new optical switch

Outstanding Young Scientist

Dr. Milko E. van der Boom

DR. MILKO E. VAN DER BOOM
Department of Organic Chemistry, Weizmann Institute of Science.
For his interdisciplinary materials chemistry program focusing on metalloorganic-oriented synthetic and mechanistic studies, where chemical synthesis is closely linked to a broad array of methods to elucidate structure, reaction mechanism, bonding, and material properties.

Excellent Teachers

Dr. Dalia Cheshnovsky

Dr. Dvora Jacobi

DR. DALIA CHESHNOVSKY
Ostrovsky High School, Ra'anana
and
DR. DVORA JACOBI
Hemd'a (Science Education) High School, Tel-Aviv
For innovation in teaching chemistry and leadership In the chemistry teachers community

Schroedinger Medal

Prof. Sason Shaik

PROF. SASON SHAIK
A member of the Department of Organic Chemistry in the Hebrew University, Jerusalem, and The Lise Meitner-Minerva Center for Computational Quantum Chemistry was awarded by the World Association of Theoretical and Computational Chemists The Schroedinger Medal for 2007. Professor Shaik has been awarded with this honor for his outstanding contributions to the understanding of the chemical bond, reaction mechanisms in organic chemistry, and enzymatic reactivity.

Honorary Doctorate and Wacker Prize

Prof. Yitzhak Apeloig

PROF. YITZHAK APELOIG
President of the Technion and a member of the Schulich Faculty of Chemistry at the Technion and The Lise Meitner-Minerva Center for Computational Quantum Chemistry was awarded an Honorary Doctorate (Dr. Honoris Causa) by The Technical University of Berlin, Germany, in recognition of his outstanding scientific achievements in the field of organosilicon and computational chemistry, excellence in teaching, academic leadership and in recognition of his exceptional academic and personal relationships with German scientists.
Professor Apeloig was also awarded the 2007 Wacker Silicone Award , one of two most prestigious prizes in the world in the field of silicon chemistry . He received this award in recognition of his pioneering theoretical and experimental work in organosilicon chemistry. His outstanding achievements in the chemistry of organosilicon compounds significantly broadened world knowledge in this important scientific field in general and in industry specifically.

האוניברסיטה העברית בירושלים
The Hebrew University of Jerusalem

החברה הישראלית לכימיה
The Israel Chemical Society

הכינוס ה-73 של החברה הישראלית לכימיה

מאורגן על-ידי המכון לכימיה של האוניברסיטה העברית בירושלים

The 73rd Meeting of the Israel Chemical Society

Organized by the institute of Chemistry, The Hebrew University of Jerusalem

4-5 בפברואר 2008

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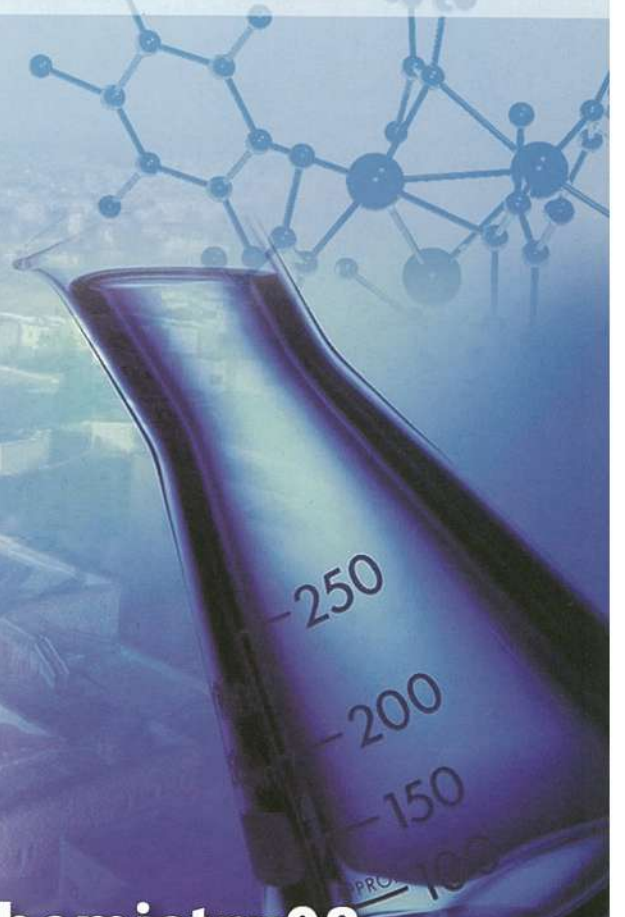
9. Drug Design
10. Computational Chemistry
11. Analytical Chemistry
12. Renewable Energy Sources
13. Electrochemistry in Materials Science
14. Novel Synthetic Methods
15. Industrial Chemistry
16. Green & Sustainable Chemistry, CleanTech
17. Chemical Education
18. Physical Organic Chemistry
19. Advanced Pharmaceutical Formulations and delivery systems
20. Chemistry of Fuels



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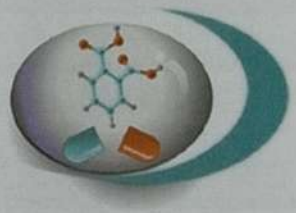


The 6th Congress of The Israel Association for Medicinal Chemistry Meeting Report

Dr. Asaph Aharoni
Dr. Shai Rahimipour
Dr. Lior Zelikovich

March 18th, 2007, Ebner Auditorium at the Weizmann Institute of Science

Organizing Committee:
Asaph Aharoni, Weizmann Inst. of Science
Shai Rahimipour, Bar-Ilan University
Lior Zelikovich, Chemagis Ltd.

Advisory board:
Avi Domb, The Hebrew University of Jerusalem
Jeffrey Sterling- Teva Pharmaceutical Industries
Matityahu Fridkin- Weizmann Inst. of Science

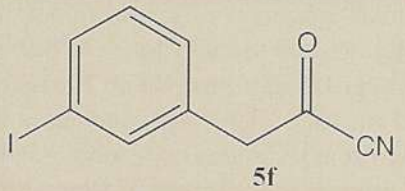
Secretary:
Malka Nehemia, The Hebrew University of Jerusalem

The Israel Association for Medicinal Chemistry (a branch of the Israel Chemical Society) held its annual meeting on 18th March 2007 at the Weizmann Institute. Medicinal chemistry contains many areas of chemistry, molecular biology, and material sciences as well as computer science. It plays a central role in drug design, discovery and development. As such, speakers as well as audience represented a variety of disciplines from the academia dealing with biology, chemistry and material science and industrial entities. The meeting program was divided to four sessions including a first session on "Peptides and proteins", followed by two sessions on "Drug development" and a last session on "Bioactive natural products". Dr. Asaph Aharoni from the Weizmann Institute opened the meeting on behalf of the organizing committee (together with Shai Rahimipour from Bar-Ilan university and Lior Zelikovich from Chemagis). Prof. Shlomo Margel the head of the Israel Chemical Society and Prof. Avi Domb the head of the Israel Association for Medicinal Chemistry followed with a few words on behalf of the two societies.

Prof. Anna Maria Papini from The Laboratory of Peptide & Protein Chemistry & Biology, Department of Organic Chemistry at the University of Firenze, Italy, presented the first lecture of the meeting. In her presentation she demonstrated a chemical reverse approach to detect biomarkers of autoimmune diseases. Autoimmune diseases affecting an increasing number of individuals throughout the world and representing a large and diverse group of disorders categorized by tissue injury or pathology. Thus, reliable diagnostic/ prognostic tools are necessary not only for an early diagnosis but also for monitoring disease activity. While the practical value of autoantibodies has been realized in some clinical conditions, it remains underutilized in the majority of diseases. In fact, sera from patients suffering from autoimmune disorders often contain multiple types of autoantibodies. Some autoantibodies can be exclusive of a disease and thus used as biomarkers for diagnosis; others fluctuate with disease exacerbations or remissions and are extremely valuable in the follow up of patients. In this scenario, identification of autoantibodies, as disease biomarkers, should be achieved using native antigens in simple biological assays. However, growing evidences indicate that post-translational modifications (i.e., acetylation,

lipidation, citrullination, glycosylation), either native or aberrant, may play a fundamental role for specific autoantibody recognition in autoimmune diseases. In this context, Prof. Papini and her co-workers have recently developed CSF114(Glc), a structure based designed glucosylated peptide, characterized by a β-turn structure, as the first Multiple Sclerosis (MS) Antigenic Probe accurately measuring high affinity autoantibodies (biomarkers of disease activity) in sera of a statistically significant patients' population. The selection of the glycopeptide CSF114(Glc) was possible because of an innovative "chemical reverse approach" optimizing the glycopeptide sequence able to detect the most specific and high affinity autoantibody titre in sera. This approach was extended to other autoimmune conditions, proposing CSF114 as a "Universal Peptide Scaffold" to be modified for specific biomarkers recognition. Therefore, modification of the CSF114 β-turn structure with different aberrant post-translational modifications, each one specific for antibody-mediated forms of different autoimmune diseases, is leading to a family of Antigenic Probes to be used in diagnostic/prognostic immunoassays for guiding specific therapeutic treatments. Prof. Papini's presentation was followed by the talk of Prof. Yechiel Shai from the Weizmann Institute that presented his team's work on the HIV-1 fusion peptide (FP). FP is a 16 amino acids hydrophobic region located in the N-terminus of the HIV gp41 envelop protein and functions together with other gp41 domains to fuse the virion with the host cell membrane. Prof. Shai's team found that that FP inserts to the same domain where the CD4 and the T-cell receptor (TCR) are co-localized and that FP specifically recognizes the transmembrane domain of TCR and interferes with its self assembly, a process required for the activation of the T-cells. Importantly, they showed that FP inhibits the activation of arthritogenic T cells in the autoimmune disease model adjuvant arthritis and reduces the disease-associated IFNγ response. Their data demonstrates that FP plays two roles in HIV infection: it mediates membrane fusion while down-regulating T-cell responses to itself that might block infection. From a therapeutic point of view, the FP is a novel molecule to cure autoimmune diseases. Dr. Hanna Rapaport from the Department of Biotechnology Engineering in Ben-Gurion University closed the first session. She presented a novel attempt for Promoting bone regeneration by novel synthetic peptide scaffolds. The rational design and fabrication strategies of biological materials with diverse structures, functionalities and utilities are steadily advancing. The study utilizes protein secondary structural motifs, mainly b-sheets, to form ordered molecular assemblies amenable to nanometer-scale applications and to bottom-to-top design and fabrication of biomaterials. Amphiphilic and acidic-rich B-sheet peptide films were shown to provide templates that accelerate the nucleation of the bone mineral hydroxyapatite. These peptides may assemble under physiological conditions into three-dimensional hydrogel matrices. This new class of designed peptide-hydrogels is currently being developed to provide versatile biomimetic scaffolds for engineering and regeneration of bone-tissue.

The first lecture of the "Drug Development" session was presented by Prof. Abraham Nudelman. The reverse transcriptase (RT) of HIV-1 is an essential enzyme in the retroviral life cycle that cause AIDS. Since its discovery a massive search for molecules that block RT activities has been conducted worldwide. However, the high specificity of these compounds reduces their efficacy against mutated variants of the virus. Given that the protein targets for therapy, especially the RT and protease, are quite flexible and can tolerate mutations that still remain active, resistance develops rapidly during treatment even when a combination of drugs is used. Consequently, intense efforts have been directed in recent years to find broad-spectrum compounds that inhibit both wild type and drug-resistant variants of RT. Prof. Abraham Nudelman from the Department of Chemistry at Bar-Ilan University and his colleagues from Department of Cell and Developmental Biology at Sackler School of Medicine, Tel Aviv University have used molecular modeling to design de novo broad-range inhibitors against the wild type and drug resistant variants of the reverse transcriptase of HIV-1. After successful



5f

DNA polymerase, IC_{50}=3.5 μM RNase H, IC_{50}= 20 μ

modeling by Alon Herschhorn from Tel Aviv University, small number of potential active molecules have been synthesized and screened for the interaction with each one of four RT structures (one wild type and three mutants). Then, these fragments were linked to build a scaffold molecule. Based on this molecule, 27 different compounds were synthesized and tested against the two activities of RT: DNA-polymerase and ribonuclease H (RNase H). Out of 27 different compounds that were synthesized, four inhibited the DNA polymerase activity of RT with IC_{50} values below 10 μM. One of the compounds, 5f, inhibited RT with an IC_{50} value of 3.5 μM and when tested against drug-resistant RT variants it showed a significantly better profile of inhibition compared to that of the clinically used drug, nevirapine. This compound also inhibited the RNase H activity of RT with an IC_{50} of 20 μM and therefore targets both RT activities. Accordingly, the family of compounds synthesized can serve as leads for developing novel potent inhibitors of HIV RT that can be used to suppress the growth of HIV and thus serve for treating acquired immunodeficiency syndrome (AIDS) patients. Dr. Hussein Hallak from Global Innovative R&D, Teva Pharmaceutical Industries talked about novel methodology in drug discovery and early development in development of new drugs in innovative pharmaceutical companies and shows how to get as efficiently as possible from ligands to drugable entities based on pharmacokinetics of the molecules. Selection of a drug candidate early in the development process is one of the most critical decisions any pharmaceutical company can make. Decisions made early on in the process can have huge consequences later on development. Over the past 15 years great progress has been made in the area of ADME. This progress is best illustrated by the dramatic decrease in the number of compounds terminated from clinical development for pharmacokinetic reasons. This presentation reflected the progress made over the past 15 years and illustrated with examples of the usefulness of current screening assays used to characterize ADME properties at the discovery stage. Prof. Dror Harats from Tel Aviv University and VBL Ltd talked about innovative strategy to treat atherosclerosis by new small molecule trough modifying the immune system. Prof. Harats presented a family of new phospholipids analogues that were designed to attenuate local inflammatory responses. It was found that the new molecules are capable of suppressing secretion of the pro-inflammatory IL-12 secretion by activated murine dendritic cells. These findings are consistent with an at least partial T-helper 1 to T helper 2 switch induced and a potential surrogate for the anti inflammatory effects. The findings gathered in the experimental models and the sound safety profile from the comprehensive toxicology studies have prompted us to embark upon a Phase I study in which healthy volunteers were administered with escalating doses of CI-201. Up to a dose of 30mg no side effects were evident and the study is on going to provide further information as to the desirable PK. In conclusion, it was shown that novel phospholipids analogues are of potential benefit for the future treatment of immune mediated disorders including atherosclerosis. Dr. Itai Adin from Chemagis, presented practical aspects of polymorphism and particles sizes in API (Active Pharmaceutical Ingredients) industry. The presentation focused on physical properties of pharmaceutical powders. Many drugs are practically insoluble in water. In these cases, the distribution of sizes of the drug particles in the final dosage form will influence the dissolution rate in the living body, and hence the bioavailability. Final dosage forms (tablets, capsules, creams etc.) which are prepared via dry formulations are therefore particles-size dependant. The distribution of sizes in API's are carefully studied during the drug development period, and later monitored during

From right to left: Dr. Lior Zelikovich, Prof. Avi Domb, Dr. Stephen Cherkez, and Prof. Michael Chorev

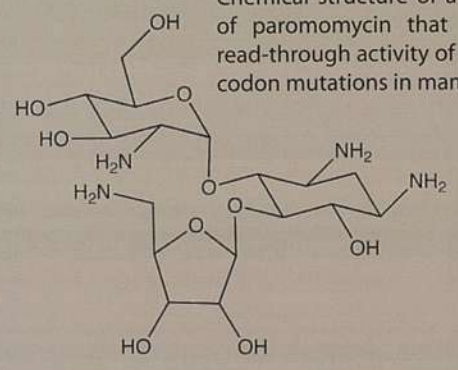
production in order to achieve batch-to-batch comparability. In the specific case study presented by Dr. Adin, the differences in bulk properties that may arise from production process were presented.

Soon after the lunch break, Prof. Chorev announced the 2007 Michael Chorev Annual Awards for Excellence in Medicinal Chemistry. The award for life achievement in the medicinal chemical industry was awarded to Dr. Stephen Cherkez from Perrigo for his unique contribution to the establishment of the generic chemical pharmaceutical industry in Israel, for the initiating of Chemagis, developing of business strategy for pharmaceutical market and for building strategy for pharmaceutical intellectual property. By all these activities Dr. Cherkez found to be a leader opening the road for the Israeli pharmaceutical industry to international markets. Dr. Cherkez is presently VP of Product Development & Intellectual Property of the pharmaceutical company Perrigo (formerly Agis Industries Ltd.). Dr. Cherkez is the founder and first president of the chemical-pharmaceutical company Chemagis Ltd. 1985-1993. Chemagis today is one of the leading API manufacturers in the word. Before Perrigo, he was Head of the Chemical Research of Teva. 1983-1985. He obtained his B.Sc degree from the Technion-Haifa and his M.Sc. and Ph.D. degrees from the Tel-Aviv University. All in all, Dr. Cherkez has been active in different management functions in the pharmaceutical industry for more than 45 years and also co-authored 28 patent applications. The award for excellent PhD work was given to Roey Jacob Amir from School of Chemistry, Tel-Aviv University for his outstanding work on "Multi-Triggered Self-Immolative Dendritic Compounds, Their Preparation, Compositions Acted Upon by Logic Gate, and Use". Amir was involved in the writing of two patent applications and eleven papers. The award for postdoctoral work was given to Dr. Reem Smoum-Jaouni from the school of pharmacy, The Hebrew University in Jerusalem for her outstanding work. Dr. Reem Smoum-Jaouni has published five articles and wrote three book chapters and reviews.

Dr. Fernando Patolsky from Tel-Aviv University opened the second session on "Drug Development" and the title of his talk was "Silicon Nanowire-based Electrical Devices in Biomedical Applications: Nanotechnology Meets Biology". The detection of biological and chemical species is central to many areas of healthcare and the life sciences ranging from uncovering and diagnosing disease to the discovery and screening of new drug molecules. Hence, the development new devices that enable direct and rapid sensing of these species could impact in significant ways humankind. Nanoscale wires or nanowires are a natural choice for building new devices since their diameters are comparable to the species being detected making them highly effective transducers. The presentation focused in the use of nanowires as powerful and general class of ultrasensitive, direct electrical detectors for biological and chemical species. Dr. Patolsky discussed detection examples from proteins and DNA to drug molecules and viruses down to the ultimate level of a single

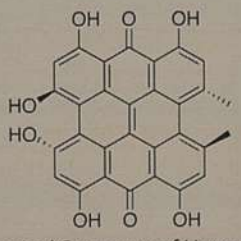
Prof. Anna Maria Papini

From left to right: The organizing team; Drs. Shai Rahimipour, Asaph Aharoni and Lior Zelikovich



Chemical structure of a new derivative of paromomycin that exhibit potent read-through activity of premature stop codon mutations in mammalian cells.

molecule, and indicated how advances in integration and multiplexing provide clear pathway for diverse and exciting applications. Prof. Timor Baasov from Department of Chemistry Technion - Israel Institute of Technology presented the following talk and described the development of small-molecule drug for treatment of human genetic diseases caused by nonsense mutations. A third of the inherited diseases result from premature termination codon mutations that prematurely stop the translation of proteins. In the last several years, certain aminoglycoside antibiotics were suggested as a treatment of genetic diseases resulting from nonsense stop mutations. Aminoglycosides have emerged as vanguard pharmacogenetic agents in treating human genetic disorders due to their unique ability to suppress gene translation termination induced by nonsense mutations. However, high toxicity of these drugs in humans limits their therapeutic use. The theme of Prof. Baasov have succeeded to design and synthesize new aminoglycosides that are generated from natural occurring antibiotics, paromomycin, that demonstrated higher stop codon read-through activity in cultured cells compared to those of paromomycin. Some of these compounds showed exceptionally high selectivity on protein synthesis inhibition in eukaryotic versus prokaryotic system. The observed biochemical data were analyzed by solving 3D crystal structures of these molecules in complex with the eukaryotic cytoplasmic 18S and prokaryotic 16S A-sites to shed light on the mechanism of action of these compounds.



Chemical Structure of Hypericin

The last session on "Bioactive natural products" was opened by a talk of Prof. Raphael Mechoulam from the Hebrew university. Prof. Mechoulam reported on the recent advances in the field of endocannabinoids. It plays a role in neuroprotection and inflammation, lowering of anxiety and depression, certain types of pain, appetite and suckling, memory, reproduction and even bone formation, to mention just a few. His team recently reported on the presence of arachidonoyl serine in brain. It does not bind to the known cannabinoid receptors; however it causes vasodilation. He also described other new endocannabinoids, endocannabinoid-like molecules and new receptors that were discovered in recent years including: Tetrahydrocannabinol (THC), a plant constituent, that is used for appetite enhancement in AIDS and cancer patients, Rimonabant, a cannabinoid antagonist, has been introduced by Sanofi as an anti-obesity drug and also Sativex, a mixture of THC and cannabidiol, is an approved drug in Canada and several European countries as an inhalant in multiple sclerosis. Dr. Gad Lavie from Institute of Hematology & Blood Center, Sheba Medical Center, Tel-Hashomer has demonstrated the ability of Perylenequinones as exo-ubiquitinating agents that induce forced ubiquitination of specific targeted proteins within cells that leads to the inhibition of cell signaling pathways. Ubiquitin-proteasome pathway-mediated protein turnover plays critical roles in homeostasis, cell cycle regulation, tumorigenesis and apoptosis, emphasizing the anti-cancer therapeutic potential of modulating the ubiquitin-proteasome pathway. However, thus far, only few proteasome inhibitors have been incorporated into clinical use as anti cancer agents. Dr. Lavie and his co-worker have shown that perihydroxylated and methoxylated perylene quinones can selectively target intracellular regulatory proteins for forced ubiquitination, generating highly potent anticancer activities. *In vivo* studies with HY demonstrated inhibition of breast and squamous carcinoma tumor metastases. Moreover, HY interfere angiogenesis in rat eye iris and cornea models and in matrigel plugs. These activities prompted Dr. Lavie to evaluate HY in a phase I/II clinical trial in malignant gliomablastoma (GBM) and anaplastic astrocytoma patients. The response

rate was 28%, with some patients continuing on a compassionate arm beyond one year. These studies indicate that perihydroxylated and methoxylated perylene quinones are effective exogenous inducers of forced ubiquitination, which are potentially useful in anti-cancer and anti-angiogenic therapies. The final talk of the meeting was presented by Prof. Avigdor Schertz from the Weizmann Institute that described the use of vascular targeting photodynamic therapy (VTP) as a new paradigm in cancer management. In the last decade his group developed a novel class of bacteriochlorophyll (Bchl) derivatives that enable Vascular-Targeted Photodynamic Therapy (VTP), a treatment approach in which activation of a light-sensitive agent (a photosensitizer) in the circulation of the target tissue leads to production of reactive oxygen species (ROS) that initiate rapid impairment, preferentially occlusion, and blood stasis of the tissue's vasculature. Necrosis or apoptosis of the cellular compartment result from subsequent deprivation of cells from nutrients and oxygen as well as intoxication by secondary radicals. Today, this approach is in clinical trials for the treatment of prostate cancer and age-related macular degeneration (AMD) using Tookad® (WST09), and Stacel (WST11), two drugs invented in his laboratory and developed for the clinics by Steba Biotech and Steba Labs. In patients that failed radiation therapy of localized prostate cancer, at appropriate drug and light doses, Tookad-VTP resulted in 50% cure rate following one treatment. A second treatment appears to significantly increase the cure rate with minimal side effects. Synthesis of tumor homing Bchl derivative such as those conjugated to RGD was shown to enable identification of tumor metastases and their selective treatment. These findings have open the way for chronic management of multiple tumor lesions by local/focal Bchl based VTP.

To summarize, the one-day meeting of The Israel Association for Medicinal Chemistry emphasized the advancements and novelty in the field of medicinal chemistry. A big credit is due to the content and delivery of the presentations. More than 200 participants joined the meeting and this number will most probably grow in the years to come.

The Department of Biological Chemistry at the Ariel University Center of Samaria

Dr. Gary Gellerman

The Department of Biological Chemistry at the Ariel University Center of Samaria was established in 2003 and it is the youngest department of Biological Chemistry among the Israeli higher education institutions. Despite its young age, the department already has a strong multidisciplinary character. Its core activities are designed to rationally employ the tools of advanced Organic and Inorganic synthesis in modern biochemical, pharmacological and advanced material strategies for the development of new biologically active compounds as well as novel and state-of-the-art technologies in drug discovery and material science. Our eight faculty members are making great strides to generate and disseminate new knowledge and original concepts in chemistry through creative research and scholarship. Our department is accredited to bestow the degree of Bachelor of Sciences, B.Sc. The department's faculty members are responsible for the chemistry course curricula in the tracks leading towards a B.Sc. degree in the following programs: Biological Chemistry as well as Molecular Biology, Biology, Chemistry for Biotechnology and Chemical Engineering programs. The central enquiry point is the Admissions Office (Tel: 03-9066631; e-mail: oshrata@ariel.ac.il), which administers graduate applications within the Department. All the members of our staff will be pleased to answer questions about their research interests by telephone or e-mail; individual telephone numbers and e-mail addresses are given on their respective web pages, which can be accessed from our homepage: www.yosh.ac.il/chemistry/. The

Biological Chemistry Department offers an exciting program of research orchestrated by a dynamic group of faculty members and more than 20 graduates and Ph.D. students using our state- of-the-art facilities. The Department offers a wide variety of services including a library, the chemical store, electronics and computing facility, the NMR lab, the Mass Spectrometry facility (GC-MS), FTIR/UV lab and analytical equipment. In addition, we offer advanced courses of specialty areas reflecting the research interests of our faculty. One of them is the drug synthesis lab, where students synthesize and characterize a true drug employing all needed analytical and spectral equipment. Ariel Univ. Center is the only institution in Israel where such an advanced course takes place. Following this Introduction, the reader will find a brief summary of the major research interests of our Department divided by scientific fields:

1 Bioorganic and Medicinal Chemistry

(Prof. Shimon Shatzmiller, Chair,
Dr. Gary Gellerman, Dr. Irina Kustanovich)

Our research in Bioorganic and Medicinal Chemistry covers hit to lead optimization, targeted drug delivery, combinatorial chemistry and development of novel antibiotics. **Prof. Sh. Shatzmiller** focuses on the design and synthesis of contrast agents and imaging systems for radiography, synthesis of novel unnatural amino-acids and their incorporation in novel peptidomimetic antibiotics as well as the development of industrial processes for new drugs. Recently he entered into Gene Therapy research, linking Peptide Nucleic Acids (PNA) with peptide carriers yielding chimeras for delivery. **Dr. G. Gellerman** specializes in Heterocyclic and Combinatorial Chemistry, Solid Phase Synthesis and Drug Design, Dr. Gellerman's main research focuses on the development of novel multifunctional platforms for programmed release. These platforms can carry different drugs simultaneously and are designed as links to any known carrier. The application for such programmed drug delivery systems is broad including cancer therapy, cardiovascular diseases, pain management, CNS disorders and others. In another aspect of his research, Dr. Gellerman develops novel medicinally relevant scaffolds suitable for Combinatorial Chemistry on Solid Support. The libraries of small molecules generated from these scaffolds follow Lipinski's role of 5 to improve the chances of old bioavailability from the early stages of the discovery process. In addition, Dr. G. Gellerman is also involved in the development of novel antifungal compounds for agriculture using structure activity relationship (SAR) approach. Moreover, Dr. Gellerman collaborates with biologists from CJS preparing peptide conjugates for Photodynamic Therapy (PDT) for various hematological cancers. Structural Biology Research implementing the high-resolution NMR spectroscopy is pivotal determining biologically valuable protein-protein and protein-ligand interactions. **Dr. Irina Kustanovich** uses high-resolution multidimensional NMR spectroscopy to investigate dermaseptin antimicrobial peptides in their "native state" at physiological conditions. NMR-derived structures of a large number of native, mutated, chemically modified and truncated dermaceptin analogues show a strong correlation between their well-defined three-dimensional structures and their biological activity.

The helical structure of the peptides displays a distinct electrostatic distribution that seems to be responsible for many aspects of their biological functions.

2 Bioinorganic, Inorganic and Radiation Chemistry

(Prof. Dan Meyerstein, President, Prof. Haim Cohen)

The research of the Inorganic Chemistry group involves both the synthesis and characterization of new coordination complexes. The synthesis of the compounds is supported by the design and preparation of organic ligands appropriate for selectively binding transition metal ions, often in a particular oxidation state. **Prof. Meyerstein and Prof. Cohen** interests span radiation chemistry, bioinorganic chemistry, complexes with metals in uncommon oxidation states, Metal-Carbon s bonds, red-ox reactions, free-radical kinetics and organometallic ligand design. In particular their group study: Radiation effects on chemical systems, formation and decomposition of Metal-Carbon s bonds in aqueous solutions, b elimination reactions (cleavage of C-X bonds) at ambient temperature; red-ox reactions of macrocyclic transition metal complexes, radical reactions (organic and peroxyl radicals) in aqueous solutions, chemical properties of metal complexes in uncommon oxidation states and red-ox catalysis, low temperature oxidation of coal piles under atmospheric storages. Mass spectrometry, UV-vis spectrophothometry, FTIR spectroscopy and Gas-chromatography are the tools used for quantitative and qualitative determinations of inorganic and organic compounds.

3 Material Science

(Prof. Michael Zinigrad, Dean of Natural Sciences Faculty)

The quality of metallic materials depends on their composition and structure. These characteristics are determined by various physico-chemical and technological factors. **Prof. Zinigrad** has developed unique methods of mathematical modeling of phase interaction at high temperatures. These methods allow him to build models taking into account: thermodynamic characteristics of the processes, influence of the initial composition and temperature on the equilibrium state of the reactions, kinetics of homogeneous and heterogeneous processes, influence of the temperature, composition, speed of the gas flows, as well as hydrodynamic and thermal factors on the velocity of the chemical and diffusion processes. The models can be implemented in the optimization of various technological processes for the industrial preparation of steels and non-ferrous alloys as well as in material refining, alloying with special additives, removing of non-metallic inclusions, welding, surfacing, and others.

4 Electrochemistry

The fuel cells and electrochemistry group at Ariel Univ. Center led by **Dr. Alex Schechter** is advancing the study of novel materials and reactions related to polymer electrolyte fuel cells (PEMFC). His areas of interest include: research of nano-catalysts for methanol oxidation, platinum alloy and non-platinum catalysts for oxygen reduction in fuel cells and particularly methanol tolerant catalysts. Recently, his lab identified a new class of non-platinum materials, which has both scientific and commercial importance. His group is also involved in the investigation of ultrathin proton conducting electrolytes to examine the structure and inner polymer proton interaction influence on the conduction mechanism and on the transport of hydrogen, oxygen and methanol through the thin membrane. Dr. Schechter collaborates extensively with industrial and academic partners through private and governmental support.

5 Theoretical Chemistry

High-energy cluster theory constitutes a major area of investigation in Theoretical Chemistry. **Dr. Haya Kornweitz's** research focuses on the study of high-energy clusters of about 100 water molecules in surface collisions. Upon collision with the surface the water cluster shatters. Using state-of-the-art software, Dr. Kornweitz runs computer simulations of the shattering event to elucidate the mechanism and the threshold energy of the process. It was found that at higher energies the water molecules dissociate. During the shattering process, water molecules are excited, and should emit light. Dr. Kornweitz intends to calculate this emission spectrum as a function of the initial velocity of the water cluster.

ההרצאה המרכזית ניתנה על ידי אחד מחברינו, ד"ר איתן קריין מחמד"ע, ת"א: "תגליות אחרונות מהמאדים בדגש כימי"; הרצאה זו לא נפלה מהרמה שהתרגלנו אליה בשנתיים הקודמות - ובהיותה בעברית, אפילו היה לה יתרון!

2005 באשכול פיס, **קרית גת**. איש תעשיה, ד"ר גיורא אגם, פתח את עינינו לכימיה של היום-יום: "שמן מנוע ואבקת כביסה - בלי ריאקציה כימית, אבל מתוחכמים לא פחות".

2006 באשכול פיס, **נתניה**. השנה קבלנו השכלה בתחום הביוכימיה, עם הצגתו המאלפת של פרופ' אברהם נודלמן, אוניב' בר-אילן: "תרופות חדשות". עוד חידוש היה בתחום התיאטרון: צוות חמד"ע, ת"א, הציג מחזה מהנה, שהיווה משב רוח מרעננן: "מבט היסטורי על התפתחות מודל האטום".

על האוירה בכנסים, כותבת חברה ותיקה: "נדמה לי שאין עוד חבורה פלורליסטית כמו **אגודת מורי הכימיה**. חברים בה מורות, מורים ולבורנטים מכל העדות והמגזרים, והשמחה להיפגש ולהחליף רעיונות וחוויות בכנסים השנתיים כה גדולה עד שקשה לחברים המשתתפים בהם לעמוד בלוח הזמנים".

השנה ועד האגודה בא למסקנה שעדיף לקיים את הכנס פעם בשנתיים, כפי שעושים בארה"ב. בהקשר זה, השנה האגודה השיגה הנחה צנועה ($50) בדמי רישום לכנס **ChemEd 07** בארה"ב, ובנוסף נתנה **מלגות** בסך $100 כל אחת, לחברים שהשתתפו בכנס זה. גם **חברה הישראלית לכימיה** נתנה **מלגה** באותו הסכום, לחבר האגודה שהוא גם חבר החברה, שהשתתף בכנס זה.

ב. הקשר הישיר והדו-שיח בין החברים בדוא"ל:

הכנסים מהווים רק חלק קטן מפעילות האגודה. החלק הארי הוא החלפת **מכתבים בדוא"ל**, לכל אחד מְכָּמאתיים החברים. מכתבים אלה, המגיעים ישירות לתיבות הדואר, מבשרים על משרות פנויות, על כנסים והשתלמויות, על רעיונות וחידושים [לדוגמה, המידע במסגרת בצד שמאל], על שאלות שהתעוררו בכיתה, על בעיות טכניות בביצוע ניסויים והדגמות, על תאונות במעבדה והלקח הנלמד מהן, על אמצעי המחשה למכירה או לחלוקה (פוסטרים, ספרים, חומרים וכו', שהשגנו במחיר מוזל בארץ ובחו"ל).

חלק נוסף של המידע שאנו מספקים לחברי האגודה, ולכלל ציבור המורים לכימיה ומדעים, נמצא באתר **http://chimianet.zefat.ac.il**, וקוראי כתבה זו מוזמנים לבקר.

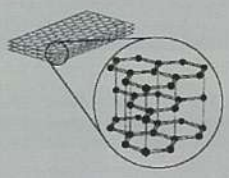
אחד הסימנים שרבים רואים בחברות דבר חיוני, הוא מספר המורים שקבלו **חברות חינם** לאחר חמש שנים בהם שלמו (לאו דווקא ברציפות). עד שנה זו 151 מורים נהנו מהנחה זו. כיום יש כ-200 חברים, וביניהם 50 כבר שלמו ל-2008 או יותר!

ברור שיש מקום לשיפור, הן טכנית, הן בפעילויות. זו אחת הסיבות שהצטרפנו לחברה הישראלית לכימיה. לשני הגופים יש עניין משותף בקידום הוראת הכימיה בבתי ספר התיכוניים. **אנו פונים אליכם, אנשים עם השפעה באקדמיה ובתעשייה, כדי שתעזרו לנו להפוך את הכימיה למקצוע מבוקש.** אנו חושבים שתוכלו לעזור לנו בכמה תחומים:

- לדאוג **שהבונוס** במקצועות הריאליים באוניברסיטאות יהיה גדול יותר מאשר של שאר המקצועות.
- להבהיר ולהדגיש שהכניסה לכל החוגים בפקולטה למדעי הטבע מותנה בציון בגרות **במקצוע מדעי אחד** לפחות.
- להסביר ולפרסם את **הצורך בידע בכימיה** בכל המקצועות של **מדעי הטבע, הרפואה וההנדסה**. יש להדגיש את הדרישות בידיעונים של האוניברסיטאות, ולהודיע מראש את מה שהסטודנטים מגלים רק אחר כך: שמי שלא נבחן בפיסיקה וכימיה חייב בקורסי קיץ. לתת לתלמידים את האפשרות לבחור ולהחליט מתוך ידיעה של הדרישות.
- בתחום **התעשייה**, לעזור לנו לגלות לתלמידים את הקשר בין הכימיה לעולם הסובב אותם. להציג בפניהם את מגוון התחומים בהם דרושה הכימיה כמקצוע. עזרה ושיתוף פעולה זו יכולות להתבטא במספר דרכים:
  - ☐ **אימוץ בית ספר**, במיוחד בתי הספר בהם קשה להשיג כספים לפתוח ולשדרוג מעבדות. במקביל לעורר את המוטיבציה ולשפר את הכלים דווקא במקומות עם אוכלוסייה חלשה מבחינה כלכלית, ועל ידי כך לפתוח את הדלת בפני תלמידים מוכשרים מאד שלא יוכלו למצות אחרת את הפוטנציאל שלהם.
  - ☐ **לתמוך בתלמידים מצטיינים**, לחלק פרסים או מלגות למצטיינים בעבודות, במחקרים ביישומים וכו'.
  - ☐ להכין **חומר הסברה והעשרה** המתאים לרמת תלמידים: תקליטורים, חוברות, פוסטרים וכו', וזאת בעזרת מורים כמובן. יש לציין שבחו"ל תחום זה מאד מפותח על ידי ארגונים דומים לחברה הישראלית חכימיה והחברות התעשיות למיניהם.
- גם באקדמיה, גם בתעשיה, יש מקום **לארח מורים בשנת השבתון**. בשנה זו המורה יעסוק בפרוייקט המשרת את המוסד, והנסיון שהוא ירכוש ישמש אותו להעשיר את ההוראה בשנים הבאות.

אגודת מורים לכימיה ומדעים בישראל תשמח לפתח רעיונות אלה ואחרים בשיתוף עם חברי החברה הישראלית לכימיה. ניתן ליצור קשר איתנו ישירות בכתובת morei.chimia@gmail.com

מה מקנה לגרפיט את התכונות של חומר סיכה ?



לאחרונה פרופ' השר הרי קרוטו (חתן פרס נובל בכימיה) סיפר שגרפיט אינו חומר סיכה הודות לכוחות ון-דר-ולס החלשים, המאפשרים לשכבות אטומי הפחמן להחליק אחת על השניה. הוא אמר שגרפיט הוא חומר סיכה הודות למולקולות מים וחמצן הנכנסים בין השכבות, והן מאפשרות החלקת השכבות. ... בחלל (או בגובה רב) בו מולקולות המים והחמצן נעדרות, גרפיט מתנהג כחומר משפשף, ולא חומר סיכה בכלל !

אגודת מורים לכימיה ומדעים בישראל (ע"ר)

رابطة معلمي الكيمياء والعلوم في اسرائيل

ד"ר יהושוע סיון

בתחילת שנה זו (2007) האגודה הצטרפה לחברה הישראלית לכימיה כחטיבה, ביוזמת החברה.

מן הראוי להציג את עצמנו לפני חברי החברה, וגם להציע דרכים בהן שותפות זו יכולה להיות לתועלת שני הגופים.

Dr. Yehoshua Sivan

A chemistry teacher almost since his arrival on aliya in 1966. Teaching in various high schools in Netanya, Or Yehuda, and mostly in Safed. He trained teachers at Bar Ilan University, until moving to Safed, also teaching in several Teachers' Training Colleges, and now teaches at Oholo College in Kazerin.

In 1999 was one of the founders of the Israeli Chemistry Teachers' Association.

Other activities: Chairman of the Committee for Ethiopian Jews in Safed for the last 20 years, and is still active in assisting in the absorption of the community.

לשם מה ייסדנו את העמותה ?

1. הרגשנו שאין ייצוג של המורים בגופים הקובעים את מדיניות הוראת המדעים...
2. יש נושאים הנוגעים לציבור המורים, כגון הרמה והתוכן של המבחנים של משרד החינוך, הוראות הבטיחות וכו', שעלינו להשמיע את דעותינו, כאשר השפעת גוף המונה מאות חברים גדולה בהרבה מקולם של בודדים.
3. הצורך בעמותה בולט במיוחד כשרואים את תרומתן של העמותות במקצועות אחרים, כמו בהוראת האנגלית...
4. ב- 50 ארצות קיימות אגודות מורים לכימיה ו/או למדעים. נראה לנו שזה לא לכבוד מדינתנו שאין בארץ אגודה דומה.

תחילת הדרך:

האגודה נרשמה כעמותה ביוני 1997, וגיוס החברים התחילה בסוף 1998. כך פנינו אל המורים:

במהרה התחלנו להצדיק את קיומנו, גם אם לא השגנו את כל המטרות שהצבנו.

במשך השנים הבאנו את השגותינו לגבי **השאלון הארצי לתלמיד במדע וטכנולוגיה בכיתה ז'**, מתחנו בקורת על חלק מהשאלון של הכימיאדה, הצבענו על טעויות כימיות **במבחני הבגרות**. אבל **מטרתו אינה להיות בקורתיים**, אלא **לקדם את הוראת הכימיה בכל דרך שהיא**. לשם כך אנו נהנים משיתוף פעולה מלאה מהמפמ"ר, ד"ר ניצה ברנע.

קידום הוראת הכימיה נעשה, עד עתה, בשני מישורים בעיקר:

א. הכנס השנתי בתום שנת הלימודים.

שמנו כמטרה לערוך כנסים שיהוו אירועים חברתיים, דידקטיים ומדעיים כאחד, על מנת ליצור אוירה של קהיליה מלוכדת, ולעודד חברי קהיליה זו להביא לכיתותיהם חידושים, ובמיוחד הדגמות וניסויים, העשויים לחבב את המקצוע בעיני תלמידיהם.

הכנס הראשון **(2001), באוניברסיטת בר־אילן**, אורגן ע"י חברנו הותיק ד"ר מרדכי ליבנה.

בהשוואה לכנסים בהמשך השנים, כנס 2001 היה צנוע. עליו כתבה מורה לאחרונה: "הכנס הראשון נערך באולם בו נאסרה הצגת ניסויים עם חומרים מאכלים, נפיצים או מסריחים. למזלנו, בכנסים הבאים הגזירה בוטלה. למרות זאת הכנס היה מרתק והיכה גלים, ואכן מספר החברים הוכפל ושולש תוך תקופה קצרה."

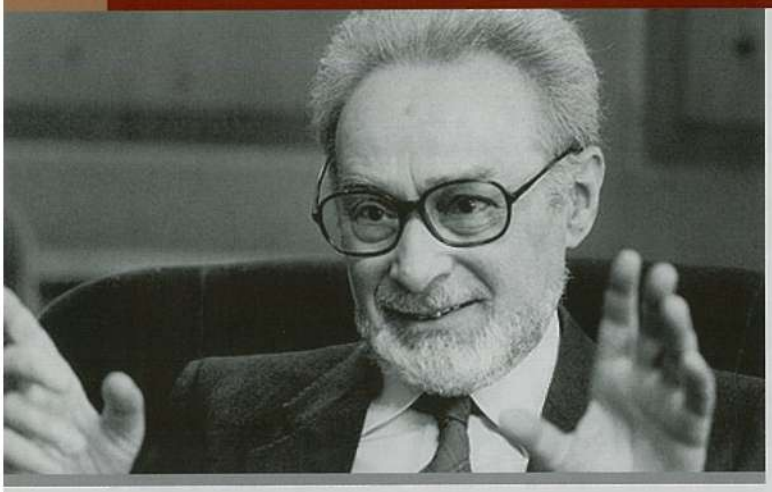
ואכן הכנסים הבאים היו גדולים ועשירים יותר, ונהגנו להזמין אורח מחוץ לשורותינו, כאבן שואבת. בהיותינו ערים לבעיות המורים במקומות המרוחקים, נהגנו לערוך את הכנס במקום אחר כל שנה:

2002 בחמד"ע, **ת"א**. Prof. Viktor Obendrauf מאוסטריה הרצאה ("גזים בין־רגע" - תגובות של גזים, בכמויות זעירות, בעזרת ציוד בעלות נמוכה) והעביר סדנה.

כאן המקום לציין שכנס זה, כמו כל הכנסים, אורגן על ידי חברי האגודה **בהתנדבות**, כמו כל שאר פעילויות האגודה.

2003 במעבדות בלמונטה, **ירושלים**. מרצה האורח היה הקנדי Prof. Irwin Talesnick, שם עולמי בתחום הדגמות הכימיה. גם הוא העביר סדנאות, בנוסף לתפריט העשיר של הכנס.

2004 בבי"ס ליאו בק, **חיפה**. לשם שינוי,



Primo Levi
(1919-1987)

Dr. Bob Weintraub

"Primo Levi is now firmly established as one of the essential writers of our century. His two principal works on the the Holacaust-*If this is a Man*, 1947, a spare but searing account of his eleven months "in the depths" of Auschwitz, and The Drowned and the Saved, 1986, a collection of essays revisiting the moral and historical dilemmas of that event and the memory of it forty years on—stand like twin pillars of humane meditation on the century's darkest moment. Indeed, it is hard to think of another figure of comparable stature who wrote and spoke of these unbearable events with such accessible economy, wit and persistence over such a long period of time."
(Robert Gordon, 2001, University Lecturer in Italian and fellow of Gonville and Caius College, Cambridge).

"Levi told his tale in what is now deservedly considered masterpieces: *If this is a Man* (1947) and *The Truce* (1963) –'written forms of oral stories which I have told countless times after my escape from Auschwitz.' But it was almost a decade before *If this is a Man* won recognition in Italy. Levi first sent the typescript to Natalia Ginzburg at Einaudi; she rejected it. But Levi looked back on the incident as fortunate: 'If I'd had an immediate success with *If this is a Man*, I would have probably given up my career as a chemist, and without chemistry, I would not have written *The Periodic Table*.' *The Periodic Table* (1975), a collection of part-autobiographical tales structured around elements of Mendelev's Table, finally confirmed Levi, as, in Italo Calvino's words, 'one of the most important and gifted writers of our time.' (Ian Thomson, 1987)

(The Voice of Memory, Primo Levi, edited by M. Belpoliti and R. Gordon; Primo Levi, Tragedy of an Optimist, M. Anissimov)

Before Auschwitz:

Primo Levi was born in Turin into an Italian Jewish family. In 1937 he entered the Chemical Institute at Turin Univeristy.
In 1938 the first of the anti-Jewish Laws were passed. Jews were forbidden to study at the universities, but those like Levi who had already begun their studies were permitted to finish. His experimental subthesis was entitled "Dielectrical Behaviour of the Ternary System Benzene-Chlorobenzene-Chloroform." The work was carried out under the direction of Nicola Dallaporta. Dallaporta was the only member of the faculty who agreed to accept Levi for an experimental project, all of the others backing away due to the racial restrictions then in force. Dallaporta later recalled having said to Levi, "Listen, do your thesis—who gives a damn about the Laws?" Levi earned his doctorate in Chemistry summa cum laude, in July 1941. The diploma specified that the holder was of the Jewish race."
Under the Racial Laws, Levi managed to find semi-clandestine work with a
asbestos mine with the task of looking into the enrichment and extraction of the nickel impurity, and then a position researching oral treatments for diabetes with an Italian pharmaceutical subsidiary of the Swiss Nestlé company.
On September 8, 1943, Italy surrendered to Germany. Levi joined the resistance and was arrested shortly thereafter on December 13,1943. He was deported to

Bob Weintraub, Director of the Libraries, Sami Shamoon College of Engineering, Beersheva and Ashdod, bob@sce.ac.il

Auschwitz, where he arrived on February 26, 1944. He was 24 years old. He was tattooed with the number 174517. In the last months of imprisonment Levi's profession afforded him some privileges which enabled him to survive. He was put to work as a chemist at the Auschwitz buna rubber complex.

After Auschwitz:

He returned to his family home in Turin on October 19, 1945. He wanted to tell the world what he had experienced.

Levi's first book came out in 1947 and sold hardly any copies. The indifference to what he had to tell was a severe shock to him. Part from a few short stories, he gave up writing until 1961. Levi found a position as a lab chemist with a paint company near Turin, SIVA, where he later became technical director and finally managing director. He remained with the firm for 29 years, until 1977. He became expert on protective enamel wire coatings.

Primo Levi in a 1976 afterword to *If this is a Man*:

"Someone a long time ago wrote that books, too, like human beings, have their destiny: unpredictable, different from what is desired and expected. This book, too, has had a strange destiny. Its birth certificate is distant: it can be found where one reads that "I write what I would never dare tell anyone." My need to tell the story was so strong in the Camp that I had begun describing my experiences there, on the spot, in that German laboratory laden with freezing cold, the war, and vigilant eyes; and yet I knew that I would not be able under any circumstances, to hold on to those haphazardly scribbled notes, and that I must throw them away immediately because if they were found they would be considered an act of espionage and would cost me my life.

Nevertheless, those memories burned so intensely inside me that I felt compelled to write as soon as I returned to Italy, and within a few months I wrote *If this is a Man*.

The manuscript was turned down by a number of important publishers; it was accepted in 1947 by a small publisher who printed only 2,500 copies and then folded. So, this first book of mine fell into oblivion for many years: perhaps also because in all of Europe those were difficult times of mourning and the painful years of the war that had just ended. It achieved a new life only in 1958, when it was republished by Einaudi, and from then on the interest of the public has never flagged."

It was with the 1984 publication of the English language translation of *The Periodic Table* that Levi achieved wide recognition, two years before his death.

Primo Levi (*The Periodic Table*, "Carbon"):

"The reader, at this point, will have realized for some time now that this is not a chemical treatise: my presumption does not reach so far—"ma voix est faible, et même un peu profane." Nor is it an autobiography, save in the partial and symbolic limits in which every piece of writing is autobiographical, indeed every human work; but it is in some fashion history.

It is—or would have liked to be—a micro-history, the history of a trade and its defects, victories, and miseries, such as everyone wants to tell when he feels close to concluding the arc of his career, and art ceases to be long. Having reached this point in life, what chemist, facing *The Periodic Table*, or the monumental indices of Beilstein or Landolt, does not perceive scattered among them the sad tatters, or trophies of his own professional past? He only has to leaf through any treatise and memories rise up in bunches: there is among us he who has tied his destiny, indelibly, to bromine or to propylene, or the –NCO group, or glutamic acid; and every chemical student, faced by almost any treatise, should be aware that on one of those pages, perhaps in a single line, formula, or word, his future is written in indecipherable characters, which, however, will become clear "afterward": after success, error, or guilt, victory or defeat. Every no longer young chemist, turning again to the verhängnisvoll page in that same treatise, is struck by love or disgust, delights or despairs.

So it happens, therefore, that every element says something to someone (something different to each) like the mountain valleys or beaches visited in youth. One must perhaps make an exception for carbon, because it says everything to everyone, that is, it is not specific, in the same way that Adam is not specific as an ancestor—unless one discovers today (why not?) the chemist-stylite who has dedicated his life to graphite or the diamond. And yet it is exactly to this carbon that I have an old debt, contracted during what for me were decisive days. To carbon, the element of life, my first literary dream was turned, insistently dreamed in an hour and a place when my life was not worth much: yes, I wanted to tell the story of an atom of carbon."

The European Association for Chemical and Molecular Sciences

NEWS

Young chemists' gateway to Europe

The idea of a young chemist's network around Europe sprang into action on 31 March 2007, in Berlin, where young chemist's representatives from 13 Chemical Societies within EuCheMS met to establish a European Young Chemists Network (EYCN). EYCN promotes interaction among chemists in European industry, academia, professional institutions and European government bodies. Through networking, young chemists contribute to the promotion of chemistry and to the development of European initiatives, including scientific programs in chemistry and molecular sciences as well as other scientific and technological areas.

The aim of EYCN is to provide a platform within the EuCheMS framework where young chemists

- present their voice in science, education and politics. In particular, all areas involving chemistry will be considered;
- discuss features of common interest, generate and expand new ideas and initiatives to contribute to the future of science and the development of the European Society;
- network with each other to form a supportive community throughout Europe;
- forge new links between academics and industrialists.

In Berlin five young chemists were elected in the first Steering Committee of EYCN: Csaba Janáky (Chair, Hungarian Chemical Society, janakycsaba@yahoo.com), Emma Dunphy (Secretary, Swiss Chemical Society emmadunphy@gmail.com), Jens Breffke (Public Relations, German Chemical Society, breffke@web.de), Maria-Cristina Todasca (Internal Communications, Romanian Chemical Society, bmcris@yahoo.com) and Juan- Luis Delgado (Treasurer, Royal Society of Chemistry of Spain, jldelgad@quim.ucm.es). Concrete initiatives of EYCN include:

- Creating a job/internship/exchange program-database, in order to establish a place for matching the needs of graduate and PhD students, post docs and other European young chemists with the demand of industry and academic institutions,
- organising and promoting events to facilitate interaction among young chemists and with eminent scientists and senior business people,
- organising and assigning awards and scholarships for talented young chemists,
- forging links with the European Commission to encourage consultation on initiatives affecting young chemists,
- promoting collaboration with other young chemist's organisations.

One of our current projects refers to the Young Chemist Award. The 2008 European Young Chemist Award is intended to showcase and recognise the excellent research being carried out by young scientists working in the chemical sciences and will be presented at the 2nd EuCheMS Congress in Torino. This award is intended to honour and encourage younger chemists whose current research displays a high level of excellence and distinction. Remuneration will be given by considering two career levels: the PhD level and the 35 years old level. For each level one Gold and two Silver Medals will be presented at a special Award Ceremony. Further detailed information will be published soon on the website of the conference.

Further contacts with young chemists are welcome! Please contact Cristina Todasca. Cristina Todasca, bmcris@yahoo.com

The EIT: 'How' not 'if'

The European Institute of Technology (EIT), or whatever it is finally named, will happen more slowly than originally intended. But too much political capital has been invested for it not to happen.

The Commission plans to establish the EIT on the model of the MIT, to link the three aspects of the 'knowledge triangle' – research, education and innovation. It will work through Knowledge and Innovation Communities (KICs) including the private sector, and excellent teams from research bodies and universities. The aim is to speed up knowledgetransfer to boost innovation. But the proposal has run into trenchant criticism, forcing the Commission to water down its ambitions.

A Parliamentary hearing in May heard that:

- the proposal is too vague and provides no added value;
- the „innovation gap" between the EU and the US is due to the amount spent on R & D;
- the 2.4 billion Euro foreseen for the EIT to 2013 is not a decisive boost in funding
- and the 308 million Euro core EU funding should be new money.

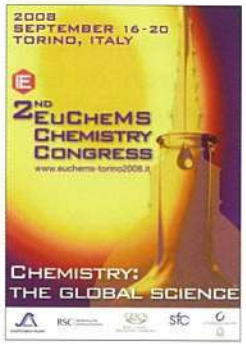
Despite this, Education Commissioner Jan Figel, charged with delivering the EIT, immediately insisted that the question was 'how' not 'if' the new body would be created, and even launched a call for KIC pilot projects at the end of June.

Ministers recently agreed a compromise two stage proposal with two or three KICs (probably around energy and climate change issues) from 2009 to 2013, with more to come later.

While MEPs then voted to endorse a re-named 'European institute of Innovation and Technology' they say 'new money' must be found before they will give final approval. Finding a compromise looks difficult, but whatever happens seasoned Brussels observers still expect the EIT to get final approval before the end of the year and the first KICs to be working by 2009.

2nd European Chemistry Congress

The 2nd EuCheMS Chemistry Congress „Chemistry: the Global Science" will take place in Torino (Italy) from 16 to 20 September 2008, co-organised by EuCheMS and the Società Chimica Italiana (SCI) as hosting society. It is a very important event for all European societies of chemistry and a large participation of members is expected from universities, industry, and both public and private institutions for research and analysis. To encourage participation of young scientists, the Local Organising Committee will provide lower fees and low cost accommodation. The Congress follows the very successful 1st EuCheMS Congress, held in Budapest in August 2006, and the Scientific Programme will maintain the same structure. It will be organised in common sessions, with plenary lectures given by outstanding scientists, and in 6 parallel sessions (18 symposia), focusing on important areas of chemistry. The special topic symposia will include keynote lectures and topic lectures, as well as oral and poster communications, selected on the basis of abstract submission. All posters will be exhibited during the whole congress, and their presentation and discussion will take place every day during lunch time and in the late afternoon. Each evening, a special common session will be devoted to the presentations of the finalists of the 2008 European Young Chemist Award Competition. A panel of judges will then select the award winners.



The ERA-Chemistry network

National research funding bodies are not well prepared to support transnational cooperation, but are in fact more inclined to hinder them. Supranational bodies usually favour big networks, which in many cases will not meet the needs of researchers. The European Research Council is prepared to finance excellence throughout Europe, but at present solely by competition of individuals. There is an urgent need to back up this programme by financing excellent cooperation of transnational groups of researchers.

ERA-Chemistry is a pan-European research- funding network in science-driven chemistry within the ERA-NET scheme of the European Commission (ERA stands for the European Research Area). The network actually consists of 14 national research funding bodies from 12 European countries as full members and of seven more national research councils as associated partners. ERA-

Chemistry encourages European chemists to initiate and reinforce transnational cooperation in joint research projects.
ERA-Chemistry will continue conducting transnational topical thematic calls for proposals, and organising strategy workshops and Flash Conferences. Currently, the biggest challenge is to organise and finance transnational cooperation in chemistry without thematic restriction in a continuous manner. We will reinforce contacts to neighbouring chemistry-related ERA-NETs, to the European Technology Platform Sus- Chem (Sustainable Chemistry) and to EuCheMS in order to establish a durable European Research Area in chemistry.

Events

2008 15 – 17 May, Cavtat, Croatia
4th CEFood 6th PBN (4th Central European Congress on Food (CEFood), 6th Croatian Congress of Food Technologists, Biotechnologists and Nutritionists (PBN), originally scheduled for 9 – 11 April 2008).
www.pbn.hr/CEFood2008/

6 – 9 July, Istanbul, Turkey
9th European Conference on Research in Chemical Education, www.ecrice2008.org/

1 August, Garmisch-Partenkirchen, Germany
4th EUCHEM Conference on Nitrogen Ligands

16 – 20 September, Torino, Italy
2nd EuCheMS Chemistry Congress
www.euchems-torino2008.it

3rd European Chemistry Congress 2010

Nuremberg will be the place to be for chemists in late summer 2010. The decision of the German Chemical Society (GDCh), commissioned by EuCheMS to organise this landmark event, received resounding approval from the EuCheMS executive committee during its last meeting in Brussels. The venue will be the Congress Centre Nuremberg on 29 August to 2 September 2010. A web site is under construction (www.euchems-congress2010.de). François Diederich from the ETH Zurich has already agreed to chair the scientific advisory board, and a local organising committee will be established by the end of 2007.

Benefit for EuCheMS members

Members of all the Societies belonging to EuCheMS are entitled to visit all the congresses, schools, courses, workshops etc., organised by the Società Chimica Italiana (SCI) at reduced registration fees. This was decided at the last meeting of the Consiglio Centrale del- la Società Chimica Italiana in May 2007. The corresponding benefit is extended to the members of the SCI that take part in the events organised by other EuCheMS Societies, e. g. RSC, GDCh, and SCF.

EuCheMS General Assembly

By invitation by the three Frankfurt-based EuCheMS member organisations (Deutsche Bunsen-Gesellschaft für Physikalische Chemie, DECHEMA and Gesellschaft Deutscher Chemiker), the 2007 EuCheMS General Assembly together with a meeting of the Executive Committee and other EuCheMS bodies will take place at the offices of GDCh and DECHEMA in Frankfurt on October 4 and 5. Presidents and other representatives of the almost 50 EuCheMS members will convene to discuss issues relevant to the Association, including the future policy strategy, the budget for the upcoming year and the planning for the 2008 EuCheMS congress in Torino. A highlight of the meeting will be the election of the new EuCheMS President-Elect who will assume office as EuCheMS President in 2009.

NEWS RELEASE

Professor Luis Oro becomes President Elect

Professor Luis Oro, Past President of the Real Sociedad Española de Quimica (Spanish Royal Society of Chemistry), has been elected to the position of President-Elect of EuCheMS. He will become President of EuCheMS in October 2008

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"הולנד-מורן" בשרות עולם הכימיה

חברת הולנד מורן עוסקת באספקה לעולם הכימיה ותחומים המשיקים לו, הן ברמה מעבדתית והן ברמה תעשייתית, ומייצגת חברות בינלאומיות מובילות בתחומן. להלן חלק מתחומי הכימיה שאנו מכסים:

1. **כימיקלים עדינים (Fine Chemicals) למעבדות, מתקני פיילוט ותעשייה:**
מגוון כימיקלים מעבדתיים ותעשייתיים בתחומים הבאים: כימיקלים עדינים אורגניים, אי אורגניים, אורגנו מתכתיים, ריאגנטים, ממסים, ממסים יבשים ביותר, מלחים. חומרי גלם תעשייתיים וחצי תעשייתיים לתעשייה ומתקני הפיילוט.

2. **מתכות יקרות – "קבוצת הפלטינה":**
Ru, Rh, Pd, Ag, Os, Ir, Pt, Au, סגסוגות,תמיסות, מלחים וכימיקלים, כלי מעבדה (פלטינה ואחרים), קטליזטורים הטרוגניים (Pd/Al, Pt/C, Pd/C) והומוגניים, חמרי לחם, מיחזור / זיקוק.

3. **חמרים בטוהר גבוה (5N-4N-3N)**
חמרים לנידוף (Evaporation) – טבליות, גרגירים, Shots, מטרות ל- Sputtering וכו'.

4. **חומרים נדירים ו - Custom Synthesis:**
היכרות רחבה עם מעבדות לסינתזות חומרים על פי הזמנות. התמחות בהשגת חומרים "קשים להשגה" ומולקולות נדירות.

5. **ביוכימיקלים:**
מגוון ביוכימיקלים רחב, מלחים וריאגנטים, מוצרי תסיסה: רעלנים, מעכבי אנזימים, מעכבים שונים (קינאז ועוד).

6. **סטנדרטים:**
חומרי ייחוס והשוואה לתעשיית התרופות (EP,BP,USP), המזון, הקוסמטיקה, איכות הסביבה, מים, הדברה, חומרים נרקוטיים, מטלורגיה ועוד.

7. **ביולוגיה מולקולרית:**
ערכות להפקות DNA/RNA. סמני גודל סטנדרטיים ולפי דרישת הלקוח.

8. **ציוד תהליכי כללי**
מערבלים, בוחשים, נפות, פילטרים, מטחנות, שינוע, טיפול בשפכים ועוד. לתעשיות הכימיה, התרופות וכו'.

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