Interview with Prof. Leeor Kronik – recipient of the 2021 ICS outstanding scientist prize

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Q: Where were you born and where did your parents come from?

A: I was born in Rehovoth. My mother was also born in Rehovoth. Having worked at the Weizmann Institute of Science for a long time, I guess I didn't stray very far… My father was born in Vilnius, Lithuania. His family fled their home when he was a toddler, as the German Army was advancing towards the city. Ultimately he made Aliyah to Israel, on his own, when he was 18.

Q: What and who inspired you to study chemistry?

A: Frankly, I didn't enjoy high school chemistry. I felt that I didn't really understand it. Yes, I could memorize some seemingly arbitrary rules and solve homework problems accordingly. But I couldn't see the logic behind it. In particular I couldn't see the emergence of a complete picture from a small set of axioms, as in math, or from a few postulates, as in physics. In an odd way, that inspired me, because I thought that there has to be more to chemistry and that one day I'll return to it. And I did, but only after a PhD thesis on optoelectronic properties of semiconductors, with Prof. Yoram Shapira at Tel Aviv University. This led me to take a life-long interest in how all properties of matter emerge from the constituent atomic species and their organization in space, which I started pursuing actively as a post-doc with Prof. Jim Chelikowsky at the University of Minnesota. By that time, I had a thorough education in quantum mechanics, which turned out to be the fundamental basis of chemistry that I was missing, and so the road back to chemistry was clear.

Q: Why did you choose your particular field of chemistry?

A: In light of the above, it is no surprise that my field is theoretical and computational chemistry, specifically first principles calculations based mostly on density functional theory. Such calculations allow the prediction of properties of matter based solely on the periodic table and the rules of quantum mechanics, which is what I was looking for all along.

Q: Do you enjoy teaching and interacting with students?

A: Very much so. In fact I was a teacher (I taught mathematics in an evening school and physics in a high school) even before

Arlene Wilson-Gordon was born in Glasgow, Scotland. She completed her BSc (Hons) at Glasgow University and her DPhil at Oxford University under the supervision of Peter Atkins. After a postdoc at the Hebrew University with Raphy Levine, she joined the faculty at the Department of Chemistry, Bar-Ilan University, where she rose to the rank of Professor and in 2015, Professor Emerita. Her research interests lie in the field of theoretical quantum and nonlinear optics. She is the editor of the Israel Chemist and Engineer, an online magazine for all who are interested in chemistry and chemical engineering.

I was a researcher. I still enjoy teaching. And I take great pride in former students who went on to have successful careers of their own in academia or in industry.

Q: What do you consider to be your greatest scientific achievement, so far?

A: My research involves both the development of the theory and its application to problems of interest. On the methodology front, I would say that a significant achievement is my part in the development of methods for accurate prediction of electron and optical spectroscopies from density functional theory, some of which have found wide use. On the applications front, I would say that a significant achievement is a set of true predictions (i.e., made before or in the absence of experiment) of the structure of molecular crystals, and of surprising mechanical, electrical, optical, and even magnetic properties thereof, including the identification of novel mechanisms.

Q: What problems would you like to tackle in the near and far future?

A: On the methodology side, I would like to tackle some of the major computational bottlenecks we face. On the applications side, I would like to expand our efforts in the area of materials for energy and sustainability.

Q: What do you consider to be your greatest contribution to Israeli society?

A: As the third generation to participate in this novel and wondrous project called the State of Israel, my greatest contribution is simply to be a part of this project, and to have my family, my home, and the center of my life in it.

Q: Would you recommend a career in academia to young scientists?

A: Absolutely! An academic career is not for everyone, but if you "caught the bug" of research, namely asking important scientific questions and working tirelessly towards finding at least some answers, an academic career can make a real difference and be very rewarding.

Q: What are the main challenges facing Israeli science?

A: There are many challenges that both Israeli and international science face. Let me mention just one. Much of what we do is supported by the public and depends on earning and maintaining the public's trust and respect. To that end, we need to do a better job at communicating scientific ideas and achievements, including their societal importance and relevance, to the general public, as part of an ongoing dialogue. We should do that without condescension and in a language that is accessible to all, or at least most, people.

Q: If you had a magic wand, what would you change a) in academic life, b) in Israeli society?

A: In Israeli Academia, if I had a magic wand I would mandate a short ethics workshop. In a world of increasing inter-personal collaboration and computer-based experiments and analysis, it is an absolute must to understand what we can and cannot do while engaging in scientific research. This goes for both how we treat data and how we treat each other. Specifically, obviously everybody should be very clear as to glowing-red lines that should not be crossed in data acquisition and manipulation. But in a modern research environment of joint publications, patents, etc., both faculty and students need to be clearly informed as to ethics of joint research.

In Israeli society, I would like to see a stronger fact-based dialogue where we are regularly exposed to, and respect, meaningful points of view that are different from our own.

Q: Do you have any advice for young people embarking on their career?

A: Follow your curiosity, speak your truth, and never compromise your values.

Q: How do you enjoy your free time?

A: Obviously spending time with my family! I also practice Shotokan Karate on a regular basis. I'm a proud member of the Israel Association of Baseball and of "Club 5" – Israel's Classic & Collectors Vehicle Club.