

## „Theory creates a world view on chemistry“

Sason Shaik is Director of the Lise Meitner Minerva Center for Computational Quantum Chemistry.

In August the GDCh awarded him the August Wilhelm von Hofmann Medal in Prague. Nachrichten aus der Chemie asked him about non-mainstream ideas and what chemistry and poetry have in common.

◆ *Nachrichten aus der Chemie:* You have been awarded the August Wilhelm von Hofmann Medal, the most international award given by the German Chemical Society. Were you surprised?

Sason Shaik: Surprised? No. But pleased? Yes. I made my career with theories that are not mainstream. I used valence bond theory, and in the beginning people thought 'Who is this guy with the useless and famously wrong theory?' It takes time to get accustomed to new generalizing ideas. I also shifted my scientific focus several times; from organic chemical reactivity to bonding and then to metalloenzymes and now to bioinorganic chemistry. In each area I tried to contribute some general or new concepts. As a result, I have always been an outsider in every community I've worked in. But being an outsider also has advantages. Because you step aside, and you tend to see the broader picture. In this sense the award is a recognition, an honour for me, despite my non-mainstream ideas. So I feel very happy about this award.

*Nachrichten:* Last year the Hofmann lecture went to Emily Carter from Princeton, also a theoretician. This year they have chosen Martin Quack from Zurich and you. Maybe theoretical chemistry is in the ascendant now?

Shaik: This is not a new feature under the sun. In fact, there is one interesting quote from August Wilhelm von Hofmann. He said: 'I

would trade all my experimental works for the single idea of the benzene theory.' Of course Hofmann was mainly a practical chemist and Chemistry remains mostly a creative science, a science of making new things. I think this will always be the case. But theory has become a partner and can guide experiment; it can make predictions and reveal things that experiments can't, such as mechanisms, very reactive species, molecules unthought before, and so on. And theory also creates a world view on chemistry: it provides a broader outlook in general. I am very happy as a theoretician...

### The Lise Meitner Minerva Center

◆ *Nachrichten:* You are the director of the Lise Meitner Minerva Center for Computational Quantum Chemistry. Could you comment on what the idea behind the Minerva Centers is?

Shaik: The Minerva Foundation is a fantastic programme, which is dedicated to promoting cooperation between German and Israeli scientists in several Minerva Centers located in Israel. The Minerva Center is financed by an endowment fund, which is invested at the maximum rate of interest. And we have a great deal of flexibility to use this money for science.

*Nachrichten:* But there is also an advisory board called by the German term Beirat.

Shaik: Yes, and the Beirat plays a major leadership role. Our Beirat



„Being an outsider also has advantages.“ Sason Shaik during discussion with Nachrichten editor Christian Remenyi at the Euchems Congress in Prague. (Foto: Ernst Guggolz)

has involved all along leading scientists in German and Israeli chemistry. Helmut Schwarz is the chairman, and the other members are Walter Thiel and Peter Schreiner. We used to have Sigrd Peyerimhoff and Joachim Sauer. The Israeli Beirat members are David Milstein, Amiram Goldblum, and Zeev Gross. The interaction with the Beirat is synergistic and it creates something that is much bigger than just taking a sum of money and dividing it among some researchers to do their research. →

*Nachrichten:* The center was inaugurated in 1997...

**Shaik:** Yes. We started with two quantum chemists: my co-director, Yitzhak Apeloig, from the Technion, and myself. And now the Lise Meitner Center is a national center that involves groups from five institutions: Hebrew University, Technion, Tel Aviv University, Weizmann Institute and Bar Ilan University. We have managed to add to the center the leading young theoreticians in Israel.

*Nachrichten:* The administration work is not becoming too much?

**Shaik:** I confess that I have always shied away from administrative jobs in academia, but in the case of the Lise Meitner Minerva Center I was fortunate to minimize the administrative work. But I was given the power – to make a difference. Working in this national center is like being on a football team. There is a lot of cohesion and a common goal.

*Nachrichten:* You, too, have created an interesting award: The Outstanding Young German Scientist Award Lectureship.

**Shaik:** This was maybe the best idea I've had as Director, because it gave us an opportunity to meet all the top young German theoreticians. Investment in young people pays off. A young person will never forget this kind of recognition. I feel very fortunate to be in a position to know these people – to interact with them and make a difference. The competition over the award also underscores the fact that Germany is really a superpower in theoretical chemistry. Remember that, in fact, quantum mechanics originated in Germany. After World War II it was exiled and went to other countries, but now my impression is that it is coming back home. Germany is probably the leading country in this field.

*Nachrichten:* In global terms, the ratio of Nobel Prize winners to the total population would surely put Israel on top. Ada Yonath said to us two years ago that nevertheless Israel has a hard time motivating young people to

go into the sciences. Has that changed?

**Shaik:** No, unfortunately not. I think the society in Israel has been influenced a lot by the popular US culture. And that means television culture. In other words, what counts is having easy money, looking successful, turning a celebrity overnight, and so on. Chemistry is not that attractive – it's complicated, and most of the time it's hard work. I remember being asked to put together a public lecture series on chemistry by an organisation that arranges courses for the public. I agreed, and I was very excited because we had topics and lecturers you can only dream of. Chemistry – we both know – is more than just a core science: it affects almost everything in life. But at the beginning of the year the course had to be cancelled – there were too few registrations.

#### ◆ „Jerushima“ by Sason Shaik

Translated from Hebrew  
by Amitai Halevi

*In a random place  
At a dim nocturnal moment  
I went down into the arcane city,  
My ears sealed against  
The shrieks of its stones.  
To no end.  
For my hands were  
Errant milestones.  
So I remained in the arcane city:  
Jerushima, its name.*

*For the city had been waste  
For many fears.  
Fettered in lights,  
Signals pulsating among them  
As if counting the years:  
A muted melody  
With a nocturnal beat,  
The lament of anguished stones.*

*In the arcane city  
The people scurry,  
Their faces – milestones  
Chiseled  
Fettered.*

#### Chemistry and poetry

◆ *Nachrichten:* So chemistry may be your true love, but I've read that you have another great love as well: poetry.

**Shaik:** Yes, I love poetry. I've been writing since I was maybe 16. Not very good poems, at least at the beginning, but I do constantly write poetry. I even published a few – I don't remember exactly how many. I like to express myself in very short sentences and precise words. And poetry is exactly that. However, at the same time, the fierce word economy in poetry creates also a great deal of subtext that endows poetry with multiple meanings. Give one poem to two people and you will get very different readings! This is the beauty and magic of language. Think about a Talmudic reading of a single phrase of the Bible... In science the magic exists elsewhere. For theoreticians it is the finding of meanings in a set of unrelated facts and phenomena.

*Nachrichten:* Some chemists feel a special connection to poetry and literature: Carl Djerassi and Roald Hoffmann are maybe the most outstanding names.

**Shaik:** Chemistry is creative and so are its makers. It would be interesting to know just which chemists write poetry. Roald Hoffmann is a very serious poet. I had a good chemist friend, Avner Treinin, who has passed away and was one of the top poets in Israel in the second half of the twentieth century. And both of these men have tended to lean toward the abstract side of chemistry – let's call it 'theory'. I didn't do any research on this, so I don't really know if it's true, but I think that in a way theoreticians may have a natural leaning towards poetry, because poetry is another way of expressing yourself in an abstract and universal way. Who knows? Maybe experimental chemists make just as good poets as theoreticians!



Sason Shaik on the  
motivation behind his  
research: video on  
[chemistryviews.org](http://chemistryviews.org)