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1984 PhD with Dimitri Coucouvanis, University of Iowa
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Current research interests: Metal chalcogenide chemistry and its applications, energy conversion, thermoelectric materials, halide perovskites, porous materials, solar energy, solar fuels, superconductivity
Hobbies: Traveling

The author presented here has recently published his ***10th article*** *in Angewandte Chemie in the last 10 years:* "Turn-On Luminescence Sensing and Real-Time Detection of Traces of Water in Organic Solvents by a Flexible Metal–Organic Framework": A. Douvali, A. C. Tsipis, S. V. Eliseeva, S. Petoud, G. S. Papaefstathiou, C. D. Malliakas, I. Papadas, G. S. Armatas, I. Margiolaki, M. G. Kanatzidis, T. Lazarides, M. J. Manos, *Angew. Chem. Int. Ed.* **2015**, *54*, 1651; *Angew. Chem.* **2015**, *127*, 1671.

I get advice from … my father and my colleagues.

When I was eighteen I wanted to be … a mathematician.

The most important thing I learned from my students is … that everyone is different. They all have different talents, experiences, backgrounds, and knowledge. Each student needs individual attention and treatment, and patience is a huge virtue. This is why it takes different lengths of time for them to mature and become "a PhD" with the skills needed for the next stage of their career. A similar approach is needed in the case of postdocs. Another thing I have learned from my students and postdocs is that personal motivation to achieve is more important that actual knowledge or even intellectual ability. Of course a highly motivated student or postdoc who is clever is unstoppable.

The principal aspect of my personality is … optimism with a good dose of curiosity. I am interested in many things especially in chemistry and science in general. Everyone you come in contact with has something to teach you.

My motto is … everything changes. Nothing is permanent. Not very original, I know, but there it is.

The biggest challenges facing scientists are … the energy challenge, the health challenge and the funding challenge. Meeting the first ensures continued progress for mankind. Meeting the second ensures a higher quality of life. Meeting the third challenge enables success in the first two.

Chemistry is fun because … it is a path to understanding how the universe works. Chemistry is the science of figuring out how to convert substances from one form to another, for example, being able to take a cotton t-shirt and convert it into sugar.

Looking back over my career, I … would do it all over again. I was fortunate to have inspiring mentors and advisors (D. Coucouvanis and T. J. Marks) and I would choose them again.

My favorite drink is … a glass or two of full-bodied red wine.

The greatest scientific advance of the past 100 years was … the development of single-crystal X-ray crystallography. The ability to solve crystal structures and find out where the atoms of a compound are in space is nothing short of a miracle. A true human achievement. This milestone was a watershed event that opened the floodgates of discovery and growth in chemistry, physics, and biology.

My first experiment was … the reaction of $(NH_4)_2MoS_4$ with elemental sulfur to form the truly unique $[MoS_9]^{2-}$ molecule. I was a first-year graduate student. This result ended up in my first peer-reviewed publication. After that I knew that this is what I wanted to do.

If I had a spare hour, I … would read Herodotus, Diogenes Laertius, and Xenophon's *Anabasis*.

If I could be any age I would be … 29 years old. It was a great year—I began my independent career.

I advise my students to … compete with their individual selves. To ask at the end of the day: "Did I do my best today? Did I do something new today?" If the answer is an honest yes, then they are doing fine.

The secret of being a successful scientist is … to be highly motivated and to be capable of getting excited relatively easily about new experimental findings. Try to do the best science you can since "the best science always wins", as my mentors have taught me.

My favorite research activity is … synthetic work. Somebody has to make the molecules and materials we will use in future applications and technologies. It might as well be someone who likes doing it. I often tell my students that "every material you discover is trying to speak to you. It is our job to figure out what it is saying". It may have remarkable properties in ways we know and expect, but also in ways we don't know and these may become apparent in the future.

My science "heroes" are … Aristarchus of Samos, Archimedes, Heraclitus, Eratosthenes, Albert Einstein, and Richard Feynman. I also admire many contemporary chemists and physicists but I will not name them lest I displease those not mentioned!

Has your approach to publishing your results changed since the start of your career?

It may have a little. This has to do with the fact that it is now very easy to find results online, whereas two or three decades ago you had to go to the library and hope that it had a subscription to the journal you were looking for. First of all, however, my philosophy of publishing research results has not changed. I try to abide by several principles. One is that "if you have not published your results don't try to get credit for it". Therefore, I try to publish everything that is new in our lab (not always succeeding). Second, "your work is published not only for the next year or two, but for the next 2000 years", as the paper should still be there in 2000 years time (barring the extinction of the human race!). So make sure that the observations and measurements are correctly described so they can be duplicated. The explanations and interpretations of the results will look interesting at the time but may later be regarded as incorrect. But the reported observations and data will never change.

What do you think the future holds for your field of research?

Who knows? I have a tendency to follow my nose and I hope we will make unanticipated discoveries that will change the way we think and do science. In the near future hopefully we will follow this current path, since in some of our projects and after so many years of research and thinking, we are finally beginning to understand some of the key issues and ask the important questions. It is when this happens that we start to make breakthroughs.

My 5 top papers:

1. "Cubic $AgPb_mSbTe_{2+m}$: Bulk Thermoelectric Materials with High Figure of Merit": K. F. Hsu, S. Loo, F. Guo, W. Chen, J. S. Dyck, C. Uher, T. Hogan, K. Polychroniadis, M. G. Kanatzidis, *Science* **2004**, *303*, 818
   Discovery of nanostructures in what was believed to be a homogenous solid solution, and a *ZT* jump to 1.7 at 750 K.
2. "New and Old Concepts in Thermoelectric Materials": J. R. Sootsman, D. Y. Chung, M. G. Kanatzidis, *Angew. Chem. Int. Ed.* **2009**, *48*, 8616–8639; *Angew. Chem.* **2009**, *121*, 8768.
   Rational strategies on how to select, manipulate, and use nanostructuring to improve thermoelectric materials to attain high performance.
3. "All-solid-state dye-sensitized solar cells with high efficiency": I. Chung, B. Lee, J. He, R. P. H. Chang, M. G. Kanatzidis, *Nature* **2012**, *485*, 486.
   Implementation of a perovskite tin iodide semiconductor material as a hole transport layer in a solid-state dye-sensitized solar cell. This work helped to usher in the era of perovskites in solar cell science.
4. "High-performance bulk thermoelectrics with all-scale hierarchical architectures": K. Biswas, J. He, I. D. Blum, C.-I. Wu, T. P. Hogan, D. N. Seidman, V. P. Dravid, M. G. Kanatzidis, *Nature* **2012**, *489*, 414.
   Going beyond nanostructuring to demonstrate all-scale structuring and achieve record efficiency in the conversion of heat into electrical energy for PbTe.
5. "Ultralow thermal conductivity and high thermoelectric figure of merit in SnSe crystals": L. D. Zhao, S. H. Lo, Y. Zhang, H. Sun, G. Tan, C. Uher, C. Wolverton, V. P. Dravid, M. G. Kanatzidis, *Nature* **2014**, *508*, 373–377.
   A surprising new layered thermoelectric material with ultralow thermal conductivity and excellent figure of merit.

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