Remembering Dr. Monica Caldararu

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Received: 16 December 2011 / Accepted: 16 December 2011 / Published online: 5 January 2012
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Dr. Monica Caldararu, senior researcher at the “Ilie Murgulescu” Institute of Physical Chemistry of the Roumanian Academy passed away suddenly on August 4, 2010. Her scientific personality, her important contributions in creating a group interested in solid–gas interactions and heterogeneous catalysis, and her multiple activities in scientific research and teaching with her PhD students have been widely recognized and appreciated.

Dr. Caldararu was born in Bucharest on May 12, 1946. She completed both elementary and high school studies in Bucharest. As a student at the Faculty of Chemistry of the Bucharest University, she displayed her ingenuity on several occasions. Her scientific carrier began in 1968 in the Center of Physical Chemistry of the Roumanian Academy, (today the Institute) where she obtained all of her advanced scientific degrees.

In 1983, she obtained her PhD degree with a thesis on kinetics of heterogeneous catalytic oxidation of lower olefins, under the guidance of Professor Ilie Murgulescu. This theme remained a subject of her research throughout her carrier.

During 1995–1996, she spent a year at the Department of Catalysis and Chemistry of Materials of the Catholique University of Louvain la Neuve, in Belgium, working with Professor B. Delmon and 6 months at the Bradford University in England, working with dr. A. Oveston and Professor J. R. Walls.

Her research work covered a wide spectrum of topics in fundamental and applied catalysis, but focused especially on the oxidation of lower olefins on bismuth–molibdate and on multicomponent catalysts. She developed a special reactor that allows, in situ, the simultaneous determination of electrical properties (conductivity

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and capacitance) and catalytic activity in heterogeneous reactions. The technique proved especially useful for the model phases of bismuth–molybdate with supported iron, cobalt or nickel that are used in selective oxidation and ammo-oxidation reactions. Their catalytic activity depends strongly on the presence of defects that result from the preparation method, thermal treatment, or interactions with the reactants.

To study the dynamics of oxide surfaces in catalytic conditions, she developed an in situ differential step technique (DST) for the separation of various steps in a surface catalytic reaction. She used this technique for the study of several reactions of single oxides as Al_2O_3 , SnO_2 , CeO_2 , TiO_2 , etc.

She was also interested in nanomaterials science and in sensors, especially the support effect. In chemisorption she was focused on strong and weak interactions of gases with solid oxide surfaces, aiming to elucidate the importance of elementary adsorption in simple catalytic reactions.

As a recognition of her scientific activity, in 1993 she was awarded the “C. D. Nenitescu” prize for chemistry by the Romanian Academy.

Her scientific activity resulted in about 100 papers published in scientific journals and around 150 communications at scientific meetings. She presented numerous invited talks throughout Europe in Belgium, Bulgaria, France, Hungary etc. She published three books, two on catalytic oxidation of lower olefins and one on kinetics of heterogeneous catalytic reactions, and also a chapter in a book on environmental problems.

Dr. Monica Caldararu was involved as Romanian coordination in several EU, NATO and bilateral projects. She was vice-president of the Romanian Catalysis Society and referee in many national and international journals.

The stimulating atmosphere that prevailed in her team was an excellent starting point for many young coworkers and PhD students who are now engaged in research.

All her life she was a modest and friendly person, devoted to her family, her team and her scientific work.

Dr. Nicolae I. Ionescu

Dr. Ionescu has given an elegant summary of the vita of my colleague Monica Caldararu. Rather than contribute a redundant and less authoritative account, I offer the following personal recollection of our first meeting.

One day, what must have been a decade or more past, I was working in my office at Drexel University with the door ajar, when a knock at the door was immediately followed by the face of a woman I had never before seen peeking past the threshold. I invited the woman in and she asked if I were Karl Sohlberg. When I replied that I was indeed, she introduced herself. She then related a remarkable story:

The woman said that she was in Philadelphia visiting her son who was, at the time, employed at the University of Pennsylvania. She had decided to take advantage of the large science library there. At the library, she had been reading a scientific paper. The paper [1] reported a computational investigation of gamma-alumina and she was excited to discover that it provided solid theoretical support for a hypothesis she had been working on for some time about the role of protons and

adsorbed water on the catalytic and electrical properties of alumina-supported heterogeneous catalysts [2]. With a little sleuthing she discovered that the current address of the lead author on the paper was Drexel University. Well Drexel happens to be directly across Chestnut Street from the University of Pennsylvania in the University City section of Philadelphia. Recognizing that she was only a few blocks away, she walked to that author's office. That author, of course, was me.

So began our collaboration. We obtained a NATO CLG and the ensuing work resulted in a series of two papers [3, 4] in *The Journal of Physical Chemistry*, as well as some related works [5] through which I met the co-Guest Editor of this issue. Over time we became not only scientific colleagues, but friends. We exchanged cards for the holidays and shared personal stories of children, health challenges and recreation.

I was saddened to learn that my collaboration with Monica had come to an early end. It is my honor to participate in this memorial issue.

Karl Sohlberg, Drexel, 2011

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