Journal of
Applied
Crystallography
ISSN 0021-8898

crystallographers

Simon Charles Moss (1934–2011)

Simon Charles Moss passed away on 14 March 2011. Simon (or Si as he was called) was born in Woodmere, New York, in 1934. He studied metallurgy at the Massachusetts Institute of Technology where he received his Doctor of Science in 1962, in the laboratory of B. E. Warren, and where he also served as a professor in the Department of Metallurgy and Materials Science. After stays at Melbourne as a Guggenheim Memorial Foundation Fellow and in industry, he joined the Department of Physics at the University of Houston. In 1991 he received the M. D. Anderson Chair of Physics.

Simon Moss received a series of awards from a number of international physics and science societies. In 1975 he was elected Fellow of the American Physical Society. Most notable among the many awards are the Alexander von Humboldt Foundation Senior Scientist Award in 1978 and 1999, and the joint Alexander von Humboldt and Max Planck Society Research Award in 1994 together with Professor J. S. Peisl, University of Munich. His work was recognized by the Von Hippel Award from the Materials Research Society in 2001 and the William Hume-Rothery Award from The Minerals, Metals & Materials Society in 2005.

The scientific achievements of Simon Moss are best summarized by the Von-Hippel Award laudation where he was cited for 'consistently timely and essential contributions to identifying and understanding the atomic level structure of almost every new type of material discovered in the last 30 years'. The main unifying thread in his work is the use of diffuse scattering of X-rays and neutrons from disordered and defective solids to study their structure as well as the effects that defects have on phase transitions, whose intrinsic disorder makes them both 'real' and challenging.

Simon Moss together with Philip C. Clapp published three distinguished papers in the mid-1960s that connect local order in alloys with the interaction energies at the atomic scale, a fundamental correlation required to predict phase transitions. This theory, now known as the Krivoglaz–Clapp–Moss theory, has served a generation of researchers and has undergone further refinements only much later. Improving the methods to deduce the local atomic arrangement in alloys always attracted his interest, in experiment and theory. With the availability of synchrotron radiation for solid-state research, Simon made use of its new properties in these investigations, for example, the easy tunability of the wavelength for anomalous diffraction. The possibility to eliminate the neutron scattering contribution of the average lattice in so-called null-matrix alloys also caught his attention. The fascinating aspect of the impact of the Fermi surface nesting on the scattering of X-rays and neutrons was another such fundamental publication. Originally, he discovered this effect in the 1960s in Cu–Au alloys, and nearly 40 years later this effect proved to be relevant for ordering in a compound as different as a high-T_c superconductor, studied in one of his numerous collaborations. In his William Hume-Rothery Award lecture in 2007, Simon put a large part of his research on atomic arrangements under the title 'How big is an atom?'.

Simon's interest in crystalline materials was, besides the alloys, much attracted by layered compounds. Based on experimental work that he and his colleagues accomplished, he also contributed to the Reiter–Moss theory for modulated liquids. This theory addresses the origin of the diffraction patterns in alkali–graphite intercalation compounds and is used to extract the modulation potential. His deep insight into the physics behind diffraction was again demonstrated when he used Bragg data from orientationally disordered C_{60} crystals to determine the single-particle orientational potential.

His scattering investigations further comprised precursors in phase transitions as seen in static and dynamic atomic displacements, martensites, crystal defects by neutron irradiation, quasi-crystals, the structure and modelling of liquids and amorphous solids, guest/host systems such as, *e.g.*, semiconductor clusters in clathrates, and thin films including studies of epitaxy and interfacial structures in metallic and semiconducting multilayers and superlattices. He kept topics in mind over many years until a better understanding could be reached. One example concerns complex phase transitions

Figure 1
Simon C. Moss (1934–2011).

like that in the V–H system, which involved collaborations with many students and postdocs from 1978 until 2010.

Always open to new active fields and guided by a sharp sense for successful and topical investigations, he was often in the right place at the right time. For example, when the 90 K high-T_c superconductors were discovered at the University of Houston by Paul Chu, he got involved in the ordering and microstructural characterization of YBCO. Together with Didier de Fontaine and co-workers, Simon Moss developed a theoretical model for the ordering of oxygen and vacancies in YBCO. This was followed by studies of complex ordering scenarios in other cuprate oxides. With the discovery of the fullerenes by Richard E. Smalley and colleagues at Rice University and the growth of the first large single crystals of C_{60} at the Texas Center for Superconductivity, another highly competitive study got started in Simon's laboratory. The extensive semiconductor multilayers activities benefitted strongly from very productive collaborations with other faculties at the University of Houston.

Essential for his success were also his close connections with many colleagues all over the world, which often resulted in a long-lasting exchange of ideas and especially highly talented students and postdocs. Most notably should be mentioned here the collaboration with J. Peisl's group at the Ludwig Maximilians University in Munich, Germany, which started in 1978 and lasted more than 20 years until J. Peisl's retirement. Simon very often spent a summer month in Munich. It was a time filled with fruitful discussions and the start of many projects and life-long friendships. There was also time to live his passion for ballet performances, classical music and fine art, especially for *Der Blaue Reiter*. From 1999 on, Simon continued this special relationship with the group of Helmut Dosch at the Max Planck Institute for Metals Research in Stuttgart, Germany, nearly until his retirement. Only the discomforts of travelling due to progressing post-polio syndrome forced him to stop the visits to his beloved 'Old Europe', but it did not prevent him from pursuing the solution of physics problems actively with the help of modern tele-communications until his last days.

A large group of students and postdocs had the pleasure to learn from him and his direct way to address questions. In his laboratory everybody felt part of a big family. For many of us, his influence was crucial in the development of our careers and we will miss his challenging discussions. All of us are very sad at his passing away. Our thoughts are with his family, with Peggy and their sons Alex, Nat and Jacob.

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