THE GREGORI AMINOFF PRIZE 2005

High pressures awarded: His Majesty King Carl XVI Gustaf decorated Ho-Kwang Mao.

This year the Royal Swedish Academy of Science decided to award the Gregori Aminoff Prize to Dr. Ho-Kwang Mao, Geophysical Laboratory of the Carnegie Institution of Washington, US "for his pioneering research of solid materials at ultrahigh pressures and temperatures". In connection with the prize presentation at the Academy in Stockholm there was a two days symposium the 9-10th of June to illuminate the latest developments and results in the field of high pressure and high temperature crystallography.

Gregori Aminoff self portrait.

Gregori Aminoff born in Stockholm 1883 had two careers – one as an artist and one as a scientist. Already as a schoolboy he was interested in minerals and the famous Arctic explorer Adolf Erik Nordenskiöld, who was Professor of Mineralogy at the Museum of Natural History, gave him free access to the mineral collection there. In 1905, aged 22, Aminoff had received a bachelor's degree and published two minor papers. It was then that he switched to painting, enrolling in a famous art school and joining "The Young", a group of young painters were to become very well known. Aminoff was successful and painted in Paris, London and Italy. He also studied for a period with Henri Matisse but in 1914 when the First World War broke out, his career as an artist ended and he resumed his scientific studies and gained his doctorate in 1918. In the same year as a lecturer at the University of Stockholm he introduced X-ray crystallography into Sweden by starting structure determination of minerals. He found the first representatives of the C6 (brucite and pyrochroite) and B8 (NiAs) types. He became Professor of Mineralogy at the Museum of Natural History in 1923. Gregori Aminoff died in 1947. In 1950 his widow Birgit Broomé-Aminoff who had assisted her husband in much of his work, died providing in her will for the establishment of a fund, the *Professor Gregori Aminoff Memorial Fund*, to be administered by the Royal Swedish Academy of Sciences. An annual prize, the Gregori Aminoff Prize, was to be awarded for theses published in the field of crystallography. For previous years winners see Table 1, which is a who-is-who in crystallography and includes names like Paul Peter Ewald, André Guinier and Hugo M. Rietveld.

This year's winner, Dr. Ho-Kwang Mao, has for more than 30 years been involved in studying material properties at extreme pressures and temperatures by using diamond anvil cell devices and synchrotron radiation. Dr Mao's efforts have inspired many successful research groups all over the world and this field of research which today has a lot of ongoing activity is in great debt to him. Mao took his PhD at the

University of Rochester in 1968 and started to work at the Geophysical Laboratory, Washington, US in the same year, where he is still today active. During the years he and his colleagues at the Geophysical Laboratory have performed a large number of high-profile experiments in the field of *in-situ* studies of phase transformations and solid-state structures at extreme pressures and temperatures. Just to mention some examples; in 1976 they were the first ones to perform experiments at a static pressure exceeding 1 Mbar, he also has made large contributions in the determination of the ruby fluorescence pressure scale and more recently measuring deviatoric stresses by X-ray diffraction parallel and orthogonal to the load direction. The list of his contributions to the high pressure research is a long one reaching many fields but to summarize it: Dr Mao has pioneered ultrahigh pressure research in physics, chemistry, and planetary sciences and discovered myriad new phases and phenomena by development of multi-megabar diamond cells.

Most of his experimental work has, as previously mentioned, been with the combination of the diamond anvil cell and synchrotron radiation and he is closely associated with the high-pressure activities at both the Advanced Photon Source (APS) and the National Synchrotron Light Source (NSLS).

Dr. Mao, whose name you also find on the widely spread Mao-Bell diamond-anvil cell, has been awarded several prestigious awards before the Aminoff price such as Mineralogical Society of America Award in 1979, the Arthur L. Day price of National Academy of Science in 1990 and the P.W. Bridgman Gold Medal Award of AIRAPT in 1997. He is a member of National Academy of Science (US) and Academia Sinica (Peoples Republic of China).

A symposium, *The Aminoff Symposium 2005*, was held during the following two days after Dr. Mao's reward. Twelve lectures were delivered and these reflected the wide variety of activities going on in the field of crystallography at high pressures and temperatures. The focus of the Symposium was on geochemistry/geophysics with several talks touching the slightly controversial question regarding the phase diagram of iron at ultra-high pressures but several other subjects were also discussed by the impressive list of speakers. For instance S.K. Saxena from the Center for Study of Matter at Extreme Conditions at Florida International University who among other things showed the use of high pressure data for a new class of ceramics, so called MAX phases, which show promise as construction materials, John Parise from the State University of New York focused on nano-particles and the physical properties of materials dependency on the particle size and Dr. Mao challenged the conventional truth that structures become more ordered with pressure in his talk about Novel Crystal Structures of Elements at High Pressure. Finally, Dr. Mao's daughter Wendy showed that she has inherited her father's interest by talking about ferromagnesian silicates at the core-mantle boundary.

Dr. Ho-Kwang Mao at the Aminoff Symposium.

The Symposium offered a unique opportunity get up-to-date up the latest developments in the field ultrahigh pressure experimental techniques and the author of this report was surprised to see, unfortunately, only about 50 attendees from Sweden at this very interesting event.

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Table 1. Winners of Georgi Aminoff Prize.

YEAR	*NAME*	*COUNTRY*	*CITATION*
1979	Paul Peter Ewald	US	For his fundamental contributions to the development of the science of crystallography.
1980	*No award this year*		
1981	Charles Frank	GB	For your fundamental contributions to the development of the science of crystallography.
1982	Gunnar Hägg	Sweden	For his pioneering application of x-ray crystallography in inorganic chemistry.
1983	J.M. Robertson	GB	For your fundamental contributions to the development of the science of crystallography.
1984	David Harker	US	For your fundamental contributions to the development of methods in X-ray crystallography.
1985	André Guinier	France	For your fundamental experimental and theoretical studies of the dispersion of X-rays with application to the study of structures of condensed systems.
1986	Erwin Félix Bertaut	France	Pour vos ouvrages eminents en cristallographie théorique et expérimentale, en particulier concernant les structures magnétiques.
1987	Otto Kratky	Austria	Für die Entwicklung der Kleinwinkelmethode bei Röntgen Studien der Struktur von Makromolekülen.
1988	Isabella L. Karle	US	For her eminent crystallographic investigations of complicated natural products.
1989	Arne Magnéli	Sweden	For his epoch-making crystallographic studies of the building principles oxide compounds, which decisively have changed the view of the relations between stoichiometry and structure in inorganic chemistry.
1990	Jack Dunitz	Switzerland	For your eminent way of using structure analysis as a tool for studying different chemical problems.
1991	David Phillips	GB	For his fundamental results on the catalytic mechanism of enzymes.
1992	Michael M. Woolfson	GB	For your development of direct methods for statistical phase determination of crystal structures.
1993	Clifford G. Shull	US	For your development and application of neutron diffraction methods for studies of atomic and magnetic structures of solids.
1994	Michael G. Rossman	US	For your fundamental methodological work on the utilization of non-crystallographic symmetry, with its especially important applications within protein and virus crystallography.
1995	Hugo M. Rietveld	Holland	In recognition of his development of profile refinement methods for the analysis of powder diffraction data.
1996	Phillip Coppens	US	In recognition of your outstanding methodological and structure chemical achievements in Crystallography, especially the studies of electrone distribution in different types of chemical bonds.
1997	Wayne A. Hendrickson	US	For your contributions to phase angle determination of macromolecular crystals using anomalous dispersion and measurements at multiple wavelengths.
1998	Ted Janssen P.M. De Wolff Aloysio Janner	Holland Holland Holland	For your contributions to the theory and practice of modulated structure refinements.
1999	Richard Henderson Nigel Unwin	GB GB	For your development of methods for structure determination of biological macromolecules using electron diffraction.
2000	Dan Shechtman	Israel	For your discovery of quasicrystals.
2001	Kenneth C. Holmes	Germany	For his pioneering development of methods to study biological macromolecules, in particular muscle proteins, by synchrotron radiation.
2002	Leslie Leiserowitz Meir Lahav	Israel Israel	For your fundamental studies of crystal growth and application to separation of enantiomers and for your studies of surface structures by synchrotron radiation.
2003	Axel Brünger	US	For his development of refinement techniques for macromolecules.
	T. Alwyn Jones	Sweden	For his pioneering development of methods to interpret electron density maps and to build models of biological macromolecules with the aid of computer graphics.
2004	*No award this year*		
2005	Ho-Kwang Mao	US	For his pioneering research of solid materials at ultrahigh pressures and temperatures