

CHES User Awards for 2003

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We are extremely proud to report on the major awards our present and past users have garnered during 2003. For all but one award recipient, these awards were given for data collected either in part or in full with CHES and MacCHES assistance. That exception is **Neil Ashcroft**, a co-founder of CHES, long-time advisor and head of the CHES Proposal Review Panel. He was awarded the 2003 Bridgman Award for High Pressure Science by the International Association for the Advancement of High Pressure Science and Technology. A member of the Cornell Physics Department, his expertise is in theoretical condensed-matter physics and matter under extreme conditions (as found in the interiors of planets). His work has frequently motivated new x-ray measurements using diamond anvil cells (often done at the B1 station at CHES). The award cites Ashcroft's contributions "to the development of the density functional theory of liquid and solid phases."

Another Bridgman Award winner (1993), **Art Ruoff** (Materials Science and Engineering, Cornell), received a Merit of Honor Award from his alma mater, the University of Utah, in March 2003. The University of Utah Emeritus Alumni Association Board presents the award each year to former students who have given distinguished service to the nation, the university, the community, and/or their profession. Ruoff was one of six recipients and the university cited him as an "international expert in high pressure and ultra pressure studies and ... author of five textbooks on the subject." Ruoff was a co-founder of the high-pressure facility at CHES (with Bill Bassett) and has pushed the frontier in high-pressure diamond anvil cell science and technique development for many years.

A citation for a seminal experiment done at CHES in the 1980's went to **Martin Blume**, **L. Doon Gibbs**, **Kazumichi Namikawa**, and **Denis B. McWhan**. They were awarded the 2003 Arthur H. Compton Award by Argonne National Laboratory's Advanced Photon Source facility in recognition of their "pioneering theoretical and experimental work in resonant magnetic x-ray scattering, which has led to important applications in condensed matter physics." Blume, now the American Physical Society Editor-in-Chief, first predicted magnetic resonance scattering in 1985 in a paper that derived the magnetic scattering cross section in a quantum mechanical formalism readily understandable by experimentalists. The effect was first observed experimentally by Namikawa and colleagues at the Photon Factory in Japan. At the same time, Gibbs and McWhan performed the first such measurements in the US at CHES A2 station.

The Bertram Warren Award of the American Crystallographic Association for 2003 was presented to **Takeshi Egami** (University of Tennessee and Oak Ridge National Laboratory), in recognition of his use of atomic PDF (pair distribution function) analysis of disordered crystals using pulsed neutrons and synchrotron x-rays. Combined with high energy x-ray scattering data, the PDF method, based on the Fourier transform of the total scattering intensity, can be used to determine both local and intermediate range structural information on a variety of materials such as semiconductors, metal alloys, oxides, and organic materials. From 1996 to 2002, Egami and colleagues used beamtime at CHES to collect experimental data, test algorithms for data analysis, and extend the technique to many new classes of materials.

In the biological sciences, **Yigong Shi** (Princeton) was the recipient of a 2003 Young Investigator's Award of the Protein Society. Sponsored by the Merck Research Labs, this award is for an important contribution to the study of proteins by a scientist not yet 38 years of age. Among several first crystal structure determinations they cited "[he] has made significant contributions to our understanding of the mechanisms of apoptosis and TGF- β signaling, two important areas of cancer research ... Yigong has made seminal contributions to our understanding of the molecular mechanisms of apoptosis."



Martin Blume

Photo credit: Bob Kelly

Hao Wu (Weill Medical College, Cornell) received the 2003 Margaret Oakley Dayhoff Award. This award is presented yearly by the Biophysical Society to recognize a junior woman scientist of very high accomplishment and very high promise and “potential in the structures of academic society”. In addition, Wu was also awarded the 2002 New York Academy of Sciences Mayor’s Young Investigator’s Award for Excellence in Science and Technology. Her research interests include structural studies related to cell survival and cell death signaling, using x-ray crystallography to visualize protein-protein interactions at atomic resolution. Of particular interest to her laboratory are protein recognition processes involved in post-receptor signaling by tumor necrosis factor receptor (TNFR).

The Biophysical Society awarded its 2003 Avanti Award in Lipids to **John F. Nagle** and **Stephanie Tristam-Nagle** (Carnegie Mellon) for their outstanding achievements in both theoretical and experimental lipid biophysics. The award is sponsored yearly by Avanti Polar Lipids, Inc. to recognize outstanding investigators doing research in lipid metabolism, lipid enzymology, or lipids in membranes. The Nagles are legendary CHES users who have collected small angle scattering data at several beamlines, using both high and low energy resolution, always bringing with them novel specimen chambers to control humidity precisely (sometimes no small feat during the summer!).

The last biology related award is, by now, a familiar story to most. Since his first visit in July 1997, **Rod MacKinnon** has visited CHES 32 times for a total of 1744 x-ray beamtime hours. He has been cited for national and international awards each year since and his latest is a share of the 2003 Nobel Prize in Chemistry for his work in elucidating the structure and function of membrane ion channels. MacKinnon, a biophysicist and self-taught x-ray crystallographer, is a professor at The Rockefeller University and is a Howard Hughes Medical Institute investigator. His work explains how a class of proteins helps to generate nerve impulses - the electrical activity that underlies all movement, sensation, and thought.



Rod MacKinnon

Photo: *Courtesy of the Rockefeller University*

The part of this story most satisfying to the CHES and MacCHES staff is that, as of late 1997, MacKinnon was unknown in the synchrotron community and admittedly not a protein crystallographer. He was offered CHES Director’s discretionary time for what was considered a high-risk project. With the assistance of the MacCHES staff, his group quickly acquired the x-ray data required to determine the atomic structure of the potassium channel. The resultant paper describing the structure was published in 1998 and quickly led to an enormous amount of scientific activity on membrane protein channels. In 1998 this work was selected by *Science* as one of the ten most significant scientific accomplishments in the world. Since then, MacKinnon has continued to use x-ray crystallography to advance the basic understanding of the way in which important biomembrane protein channels operate. The work leading to the prize was done primarily at CHES and the National Synchrotron Light Source at Brookhaven National Laboratory.

Congratulations to all the award winners from the CHES and MacCHES staff!