Brinker and Schuller Named 2003 MRS Medalists

The Materials Research Society has selected two scientists to receive the MRS Medals for 2003, which recognize a specific outstanding recent discovery or advancement in materials research that is expected to have a major impact on the progress of any materials-related field. **C. Jeffrey Brinker** (Sandia National Laboratories and the University of New Mexico) and **Ivan K. Schuller** (University of California, San Diego) will receive their medals at the 2003 MRS Fall Meeting during the awards ceremony on December 3 at 6:00 p.m. in the Grand Ballroom of the Sheraton Boston Hotel. Schuller will give his Medalist presentation, "Exchange-Biased Nanostructures," on December 3 at 10:15 a.m. in the Commonwealth Room of the Sheraton. Brinker will deliver his Medalist presentation, "Self-Assembly of Biologically Inspired Complex Functional Materials," on December 3 at 1:30 p.m. in the Hynes Convention Center, Room 304.

C. Jeffrey Brinker

Ivan K. Schuller

C. Jeffrey Brinker is cited for "his pioneering application of principles of sol-gel chemistry to the self-assembly of functional nanoscale materials." Beginning with seminal contributions to sol-gel chemistry, including the classic textbook *Sol-Gel Science*, co-authored with G.W. Scherer, Brinker has extended his original research into the area of self-assembled materials. In the late 1990s, Brinker's group combined controlled sol-gel chemistry with self-assembly processes, creating opportunities for rapid, continuous processing and precise structural control of self-assembled nanoscale materials. This process led to the development of organic–inorganic nanocomposites that mimic the microstructure and properties of biominerals, and nanoporous particles for catalytic applications. He and his group demonstrated the direct writing of functional self-assembled nanostructures using computer-driven pens and inkjet printers. This advance provided a simple, robust approach to form functional hierarchically organized structures in seconds and established a link between computer-aided design and self-assembled nanostructures. Brinker's group also demonstrated the self-assembly of photosensitive films that incorporated molecular photoacid generators compartmentalized within their periodic nanostructures. This combination of photosensitivity and self-assembly is enabling standard lithographic procedures to be used to pattern and define the structure and function of nanomaterials. His group further developed polymerizable surfactants to direct the self-assembly of periodic nanostructures and to serve as monomeric precursors to a conjugated polymer, illustrating a highly controlled method of incorporating conjugated polymers in nanostructured hosts. His group recently prepared a novel thermally sensitive polymer/ceramic nanocomposite in which the lattice structure expands or shrinks in response to a temperature change.

Several of Brinker's 250-plus publications are among the highest cited in materials research. Brinker received his PhD degree in 1978 from Rutgers University. He holds 25 patents. Among Brinker's most recent honors are Sandia National Laboratories Fellow (2003), election to the National Academy of Engineering (2002), and the Department of Energy Ernest O. Lawrence Memorial Award in Materials Science (2002).

Ivan K. Schuller is cited for his "innovative studies of exchange bias in magnetic heterostructures and nanostructures." Exchange bias, a key ingredient in read heads and for a variety of applications, is the shift of the magnetic hysteresis curve when a ferromagnetic film in close contact with an antiferromagnetic substrate is cooled below the Néel temperature of the antiferromagnet. Schuller revived basic research in this field with a series of detailed quantitative studies. His group initiated the use of transition-metal difluoride antiferromagnets (e.g., FeF_2 and MnF_2) as model antiferromagnetic materials for exploring exchange biasing. Schuller and his group demonstrated exchange bias in a fully compensated antiferromagnetic surface; a positive exchange bias that depends on both the surface roughness and cooling field strength; spin-flop coupling of the ferromagnetic and antiferromagnetic spins, verifying theoretical predictions of this phenomena; a dramatic asymmetry in the reversal modes of the ferromagnetic layer; and a coercivity enhancement above the Néel temperature of the antiferromagnetic layer. Furthermore, Schuller measured the order parameter of the antiferromagnetic surface spins and correlated mesoscopic disorder in the antiferromagnetic layer with coercivity enhancement of the ferromagnetic layer. Currently, he is extending these studies to nanostructured magnetic materials. These phenomena override previously held beliefs regarding exchange bias and elucidate the origin of many unusual experimental observations. The insight Schuller has provided into exchange bias has impact on the development of high-technology devices, such as read heads, magnetic random access memories, and magnetic sensors.

Schuller received his PhD degree in 1976 from Northwestern University. He has close to 400 technical publications and many patents. He is one of the top Highly Cited Researchers as found by the Institute for Scientific Information. His most recent honors include the American Physical Society (APS) David Adler Award (2003) and the Alexander von Humboldt Prize (2000). Schuller is a fellow of APS and a member of the Belgian and Chilean Academies of Science.

The MRS Medal is intended to offer public and professional recognition of the recipient's achievements in materials research. The award includes a $3,000 cash prize, an engraved and mounted Medal, and a citation certificate. MRS