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Shpyrko receives APS organization's Young Investigator Award

ARGONNE, Ill. (May 6, 2008) – The Advanced Photon Source (APS) Users Organization has named Oleg G. Shpyrko as the recipient of the 2008 Rosalind Franklin Young Investigator Award. The award recognizes an important technical or scientific accomplishment by a young investigator that depended on, or is beneficial to, the APS. Shpyrko received the award during 2008 Users Week at the U.S. Department of Energy's (DOE) Argonne National Laboratory, where he will also present his work.

Shpyrko has been recognized for reaching a remarkably high level of achievement early in his career. He applied challenging surface and coherent X-ray scattering techniques to understanding the structure and dynamics of liquid metal surfaces and quantum states in condensed matter systems. He is also a dedicated and enthusiastic teacher.

He received his Ph.D. degree from Harvard University in 2004 under the direction of Peter Pershan; he then had postdoctoral fellowships at Harvard and the Center for Nanoscale Materials at Argonne National Laboratory before joining the faculty of the University of California, San Diego, Physics Department in 2007.

As a postdoctoral fellow at Argonne, Shpyrko studied domain wall fluctuations in antiferromagnets, technologically important materials used to tailor the properties of magnetic sensors in hard drive read heads. In antiferromagnets, magnetic properties form distinct regions called domains. Fluctuations in the domain boundaries or walls were expected to cause magnetic noise that could affect the material's performance, but characteristics of the domains rendered them invisible to conventional techniques.

Shpyrko applied a newly developed technique called X-ray photon correlation spectroscopy to observe fluctuations of these domain walls for the first time. He found that the magnetic noise cannot be eliminated.

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Shpyrko receives award – add one

The ability to observe domain wall fluctuation is important both for engineering tailored materials and for fundamental studies in condensed matter physics.

For his thesis work, Shpyrko resolved a long-standing controversy on whether atomic layering is unique to liquid metals. He used X-ray surface scattering techniques to compare the surface structure in high-surface-tension liquid metals with the surface structure in low-surface-tension alkali metals and nonmetallic liquids. The results showed layering in alkali metals but no layering in water. The observation indicates that layering is unique to metallic liquids and it arises from electronic properties rather than high surface tension.

Shpyrko has continued to study the surface properties of liquid metals, working in particular with gold silicide (AuSi), a solder used in nanoscale circuitry. In contrast to the previously observed behavior of other liquid alloys and pure liquid metals, a nondilute liquid eutectic gold-silicon alloy (Au₈₂Si₁₈) developed both a crystallized alloy “skin” and an ordered structure extending several atomic layers into the bulk. The “skin” remained an alloy, rather than segregating to a pure metal as in other liquid alloys. The results are important because properties at the nanoscale, including the effectiveness of AuSi as a nanoscale solder, are expected to depend heavily on surface effects. Located at Argonne, the APS is a [national synchrotron X-ray research facility](#) funded by the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences. The APS provides the [brightest X-ray beams in the Western Hemisphere](#) to more than 5,000 scientists worldwide.

Argonne National Laboratory brings the world’s brightest scientists and engineers together to find exciting and creative new solutions to pressing national problems in science and technology. The nation’s first national laboratory, Argonne conducts leading-edge basic and applied scientific research in virtually every scientific discipline. Argonne researchers work closely with researchers from hundreds of companies, universities, and federal, state and municipal agencies to help them solve their specific problems, advance America’s scientific leadership and prepare the nation for a better future. With employees from more than 60 nations, Argonne is managed by [UChicago Argonne, LLC](#) for the [U.S. Department of Energy's Office of Science](#).

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