T.C.
İSTANBUL TEKNİK ÜNİVERSİTESİ
FEN EDEBİYAT FAKÜLTESİ
FİZİK MÜHENDİSLİĞİ BÖLÜMÜ
MASLAK 34469 İSTANBUL

İTÜ Fizik Mühendisliği Bölümü
Bölüm Seminerleri

Konuşmacı : Prof. Dr. John J. Boland (Trinity College of Dublin)
Konuşma Başlığı : How surface science provides new insights into the behaviour of grain boundaries in nanocrystalline metals

Konuşma Özeti

This talk focuses on the properties of nanocrystalline metal films. Scanning tunneling microscopy and simulations are used to visualize for the first time the 3D structure of grain boundaries (GBs) that emerge at the surface of nearly coplanar copper nanocrystalline (111) films. Remarkably, we find that low angle dissociated GBs are always found at valley and ridge locations, so that flat films are impossible to fabricate. This behavior is due to a previously unrecognized phenomenon that involves the rotation of the dislocation line, which minimizes the GB energy, and which has significant implication for materials properties (Science 357, 397-400 (2017)). In the case of high angle boundaries the GB core is predominantly perpendicular to the film surface and comprised of so-called structural units. However, the core reconstructs as it approaches the surface to form a dissociated GB structure, reminiscence of low-angle behavior. This surface reconstruction of GBs is expected to have significant implications for corrosion and other GB mediated process.

Kısa özgeçmiş

Prof John Boland received a BSc degree in chemistry from University College Dublin and a PhD in chemical physics from the California Institute of Technology, where he was an IBM graduate fellow and recipient of the Newby-McKoy graduate research award. From 1984 to 1994 Prof Boland was a member of the research staff at the IBM T.J. Watson Research Center (New York). In 1994 he joined the chemistry faculty at the University of North Carolina at Chapel Hill where he was appointed the J.J. Hermans Chair Professor of Chemistry and Applied and Materials Science. In 2002 Prof Boland moved to the School of Chemistry at Trinity College Dublin as a Science Foundation Ireland Principal Investigator and Professor of Chemistry. In June 2005 he was appointed Director of the Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN) until July 2013. He also served as TCD Vice President and Dean of Research (2015-2017).

Prof. Boland became an elected Fellow of Trinity College Dublin in 2008, a fellow of the American Vacuum Society (AVS) in 2009 and a fellow of the American Association for the Advancement of Science (AAAS) in 2010. He was the 2011 laureate of the ACSIN prize for nanoscience. He is the recipient of an Outstanding Researcher Awards from IBM (1992) and Intel (2017). He received the Science Foundation Ireland Researcher of the Year Award in 2018. He is the recipient of a prestigious European Research Council Advanced Grant. Prof. Boland's research interests are focussed on the novel properties of nanoscale materials and their potential in device and sensor applications.

Yer İTÜ Fizik Mühendisliği Bölümü Seminer Salonu (FEB L1 Z__)
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15.00 (14.45 Çay- Kahve İkram servisi)

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