Orlando Auciello
Senior Physicist
Nanofabrication Group (CNM)
Interfacial Materials Group (MSD)

Phone: 630-252-1685
Fax: 630-252-4798
e-mail: auciello@anl.gov
Argonne National Laboratory
Center for Nanoscale Materials and Materials Science Division
9700 South Cass Av, Bld 440 and 212
Argonne, IL, 60439

Research Summary:
My research focuses on multidisciplinary fields on fundamental and applied science of multifunctional thin films and technological application to multifunctional devices, namely:
Complex Oxide Thin Films: Ferroelectrics films and applications to non-volatile memories, high-dielectric constant films and application to nanoscale CMOS devices and high-frequency devices, transparent conducting oxide films and application to photovoltaics and solar cells.
Nanocarbon Thin Films: Micro and nanocrystalline diamond films and carbon nanotubes (CNT), and application to micro- and nanoelectromechanical systems (MEMS/NEMS-e.g., resonators switches), field emission devices, and high temperature electronics.
Micro/Nanobiointerfaces: Science of biomolecular/inorganic film interfaces involving biocompatible nanocarbon (e.g, micro/nanocrystalline diamond) and oxide (e.g., aluminum and titanium oxides) films, and applications to biomedical devices (e.g., artificial retina, bio-inspired electrodes for nerve stimulation) and biosensors.

Selected Recent Publications:
Patents (of 15)
N. Naguib, J. Birrell, J. Elam, J.A. Carlisle, O. Auciello, "A Method to Growt Carbon Thin Films Consisting Entirely of Diamond Grains 3-5 nm in Size and High-Energy Grain Boundaries", US Patent #7,128,889 (2006).

Books (of 16)
O. Auciello and A.R. Krauss (Eds.), "In Situ, Real-Time Characterization of Thin Film Growth Processing and Phenomena", John Wiley and Sons, Inc. (2001).

Book Chapters (of 24)
R. Wallace and O. Auciello "Science and Technology of High-Dielectric Constant (K) Thin Films for Next Generation CMOS", in "Thin Films and Heterostructures for Oxide Electronics", S.B. Ogale (Ed), Multifunctional Thin Films Book Series. O. Auciello and R. Ramesh (Eds.), Springer (2005) pgs. 79-126.

Papers on Refereed Journals (of 300)
S. Sudarsan, J. Hiller, B. Kabius, O. Auciello, "Piezoelectric/Ultrananocrystalline Diamond Heterostructures for High-Performance Multifunctional Micro/Nanoelectromechanical Systems", Appl. Phys. Lett. **90** (2007)13410.

O. Auciello, **Special Issue on Advances in the Science and Technology of Ferroelectric Thin Films and Devices**, invited article, "Science and Technology of Thin Films and Interfacial Layers in Ferroelectric and High-Dielectric Constant Heterostructures and Application to Devices", J. Appl. Phys. **vol. 100** (2006) 051614.

M.A. Angadi, T. Watanabe, A. Bodapati, X. Xiao, O. Auciello, J.A. Carlisle, J.A. Eastman, P. Keblinski, P.K. Schelling, S.R. Phillpot "Thermal Transport and Grain Boundary Conductance in Ultrananocrystalline Diamond Thin Films", , J. Appl. Phys. **99** (2006) 114301.

B. D. Reiss, G.-R. Bai, O. Auciello, L. E. Ocola, and M. A. Firestone, "Identification of Peptides for the Surface Functionalization of Perovskite Ferroelectrics", Appl. Phys. Lett. **88** (2006) 083903

X. Xiao, J. Wang, J. A. Carlisle, B. Mech, R. Greenberg, R. Freda, M. S. Humayun, J. Weiland, and O. Auciello "*In Vitro* and *In Vivo* Evaluation of Ultrananocrystalline Diamond for Coating of Implantable Retinal Microchips", J. Biomedical Materials **77B (2)** (2006) 273-281.

O. Auciello, J. Birrell, J.A. Carlisle, J.E. Gerbi, and X. Xiao, B. Peng, and H.D. Espinosa, "Materials Science and Fabrication Processes for a New MEMS Technology Based on Ultrananocrystalline Diamond Thin Films", J. of Physics: Condensed Matter, **vol 16** (16) (2004) R539-R552.