Nanoscience at the Center for Functional Nanomaterials, a National Scientific User Facility

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The Center for Functional Nanomaterials (CFN) is a national scientific user facility operated at Brookhaven National Laboratory for the U.S. Department of Energy (DOE). One of five DOE Nanoscale Science Research Centers, the CFN offers external users a supported research experience with top-caliber scientists and access to state-of-the-art instrumentation at no cost via a peer-reviewed proposal process. The CFN mission is advancing nanoscience to impact society, by being an essential resource for the nanoscience community and producing breakthroughs in nanomaterials research. In this presentation I will give an overview of the scientific facilities, examples of user and staff research, and summarize the process of becoming a CFN user. I will also provide a brief overview of the system of DOE National Laboratories, their scientific mission, and the role of the Labs in the research ecosystem of the United States. For students and early career researchers, I will share my perspectives on the unique aspects working in the National Labs. Finally, I will describe CFN research using block copolymer self-assembly for design of nanostructured materials. Block copolymer thin films provide a robust method for generating regular, uniform patterns at length scales in the range of ten nanometers, over arbitrarily large areas. A significant advantage of block copolymer-based patterning is its ease of integration with other aspects of traditional thin-film processing, including plasma-based etching and metallization. The CFN has been using block copolymer lithography to design the electronic and optical properties of nanostructured, thin-film materials.

BIOGRAPHY:
Charles (Chuck) Black, Ph.D., is a senior scientist and director of the Center for Functional Nanomaterials, a national scientific user facility operated at Brookhaven National Laboratory for the U.S. Department of Energy. From 1996 to 2006, Black was a Research Staff Member at the IBM Thomas J. Watson Research Center in Yorktown Heights, New York. While at IBM, he pioneered the use of polymer self-assembly as a high-resolution patterning materials for fabrication of semiconductor electronics. Black earned a doctorate degree in physics from Harvard University in 1996, and Bachelor of Science degrees in physics and mathematics from Vanderbilt University in 1991. Black has been a Member of the Board of Directors of the Materials Research Society (2015–17), is a Fellow of the American Physical Society, and is a Senior Member of the IEEE.