

NSF NANOSCALE SCIENCE AND ENGINEERING GRANTEES CONFERENCE, DECEMBER 7-8, 2021 _
**DOE Nanoscale Science Research Centers: Advancing Nanoscience through
Cooperation**

Charles Black, Ph.D.

Associate Dean of Research and Graduate Studies
Brookhaven Laboratory



Abstract: In the mid-2000s and in support of the National Nanotechnology Initiative, the U.S. Department of Energy created the network of five Nanoscale Science Research Centers (NSRCs) to establish U.S. world leadership in nanoscience. The NSRCs are operated as national scientific user facilities and provide a broad portfolio of state-of-the-art capabilities encompassing nanomaterial synthesis, characterization, and theory/computation, together with a cooperative environment to accelerate the research of academic, government, and industrial users. Since beginning operations, the NSRCs have supported over 33,000 users and contributed to more than 19,000 scientific publications. The NSRCs are major hubs for high-impact nanoscience, a vital resource for the basic materials and chemistry research communities, and a cornerstone of the DOE commitment to cutting-edge nanoscience.

In this short introduction, I will describe the unique attributes of the DOE Nanoscale Science Research Centers, which derive from combining an expert staff, a portfolio of distinctive nanoscience instruments, and a core commitment to cooperative research.

Bio: Dr. Charles (Chuck) Black 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 (DOE). Each year, the CFN supports the science of nearly 600 researchers from universities, industry, and national laboratories worldwide. Currently, Dr. Black is also Project Director for the NSRC-Recapitalization project, an \$80M DOE project to modernize the U.S. nanoscience infrastructure. Prior to becoming Director, Dr. Black was Group Leader for Electronic Nanomaterials in the CFN, leading a research program exploring nanostructured materials for solar energy conversion. From 1996 to 2006, Dr. 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 material for fabrication of semiconductor electronics. During his career, Dr. Black has also performed experimental research on ferroelectric non-volatile memories, nanocrystal-based electronic devices, mesoscale superconducting devices, single-electron tunneling devices, and low-temperature scanning tunneling microscopy. Dr. Black earned the Ph.D. degree in Physics from Harvard University in 1996, and B.S. degrees in Physics and Mathematics from Vanderbilt University in

1991. Dr. Black has been a Member of the Board of Directors of the Materials Research Society (2015–17) and is a Fellow of the American Physical Society and a Senior Member of the IEEE