

Welcome to the NIBIB/DOE Workshop on Biomedical Applications of Nanotechnology.

Science and technology at the nanoscale offer much promise for advances in biology and medicine. The ability to engineer machines and materials on the scale of atoms and molecules will greatly impact biomedical devices, therapeutics, and strategies for health care. Synthetic nanostructures are at the confluence of the smallest of human-made devices and the biomolecules that carry out life processes. This similarity in scale can facilitate nanoscale structures to interface with biological systems at the molecular level. Devices that mimic the functionality of biomolecules and biomolecular systems are also becoming feasible. Nanoscale tools are beginning to accelerate a basic understanding of the cell and related biological systems. New labels and approaches to biological imaging, tools for interfacing to molecular systems, and advanced analytical techniques are becoming available. The overlap between nanotechnology and medicine defines a relatively new field of nanobiomedicine. Its development will require interdisciplinary training, improved understanding of biological design, and advanced facilities that facilitate the application of nanotechnologies for biomedical purposes. In addition, comprehensive theoretical tools and computational resources are required that can address multiple size and time scales.

Much of the necessary technologic resources and expertise is available at the U.S. Department of Energy (DOE) national laboratories and at the U.S. Department of Commerce's National Institute of Standards and Technology (NIST) facilities. Programs that define biomedical research needs and support related extramural research and training programs exist at the National Institutes of Health (NIH). Close collaboration among these communities can enable realization of the potential dramatic advances promised by nanobiomedicine.

The goals of this Nanobiotechnology Workshop are to (1) make DOE national laboratory scientists and NIST researchers aware of NIH needs and potential new biomedical applications of nanotechnology, (2) make NIH researchers and program staff members aware of DOE and NIST technologic resources and expertise, (3) identify the scientific opportunities and issues associated with DOE/NIH/NIST interactions, and (4) promote interagency collaborations among research scientists at the NIH, DOE laboratories, and NIST.

We hope that this meeting is valuable and enjoyable to you and that you take advantage of the opportunities provided for scientific discussions and information exchange. The oral and poster presentations represent a broad scope of nanobiomedical research, and the attendees include researchers, program directors, and agency representatives who are leaders in this emerging field.

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The workshop coordinators are Peter Kirchner (DOE/Biological and Environmental Research Program [BER]-U.S. Department of Health and Human Services/NIH/NIBIB), John Miller (DOE/Office of Basic Energy Sciences), Richard Swaja (NIBIB), and Michael Viola (DOE/BER).