

National Laboratories Ready to Train a Generation of Materials Researchers in Energy

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The U.S. Department of Energy (DOE) Office of Basic Energy Sciences (OBES) recently called for a commitment to training a generation of scientists dedicated to meeting the grand challenges for energy research.* Postdoctoral programs at U.S. national laboratories offer opportunities to gain the multidisciplinary background and “big picture” perspective required of aspiring energy scientists, which includes materials researchers. Several national laboratories support such programs, with employment numbers varying from a dozen to over three hundred (see Table I). Nevertheless, policymakers, funding agencies, researchers, and the public at large are often unaware that national laboratories are playing an increasingly important U.S. workforce development role through these programs.

Postdoctoral appointments at national laboratories are highly competitive. For example, at Los Alamos National Laboratory (LANL) an internal committee of scientists reviews the qualifications of every postdoctoral candidate. It also chooses individuals to be considered for Director’s or named (Oppenheimer, Feynman, Reines) fellowships. Consequently, a diverse, multinational population of scientists from top U.S. and non-U.S. universities (about 60% are non-U.S. citizens) joins the laboratory every year. Standard appointments last two years, although third-year extensions are usually possible. To ease their transition from academia, all postdoctoral candidates are matched with staff scientists as mentors—many of them world-renowned in their disciplines.

According to OBES, future energy researchers must “communicate effectively with scientists in all of the disciplines

* U.S. Department of Energy, *A Report from the Basic Energy Sciences Advisory Committee* (December 20, 2007; www.science.doe.gov/bes/reports/files/GC_rpt.pdf) (accessed April 2009).

Table I: U.S. National Laboratories that Support Postdoctoral Programs in Energy
(numbers as of May 2009)

National Laboratory	# of Postdoctoral Researchers
Lawrence Berkeley	377
Los Alamos	330
Argonne	171
Oak Ridge	168
Sandia	154
Brookhaven	125
Lawrence Livermore	113
Pacific Northwest	111
National Renewable Energy	85
Fermi	55
Ames	45
Idaho	17
Savannah River	14
Jet Propulsion Laboratory	12
New Brunswick	1

underpinning BES research: condensed-matter and materials physics, chemistry, engineering, biology, and areas of earth and atmospheric sciences” and be expert in at least one of them. Postdoctoral candidates working at national laboratories perform world-class research in all of these areas, as illustrated, for example, by the distinguished performance and publication awards made over the past five years at Los Alamos National Laboratory.† Furthermore, because research at national laboratories is often performed in teams

† Los Alamos Postdoc Association, www.lanl.gov/science/postdocs/awards_prizes.shtml (accessed April 2009).

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that include experimentalists and theoreticians from several disciplines, postdoctoral candidates are compelled to broaden their scientific background by collaborating with scientists from different fields.

Future energy scientists must furthermore possess an “awareness of the social, industrial, and technological context of energy science.” Since national laboratories strive to integrate basic research into their broader missions, postdoctoral candidates at national laboratories have numerous opportunities to learn about the policy drivers behind the U.S. national energy research agenda and the societal impacts of basic energy research. For example, the Director’s Colloquium series at Los Alamos invites world experts to speak on issues ranging from dark energy to natural disaster response. In the past two years, a third of these colloquia have centered on energy research and the environmental concerns that motivate it.

Postdoctoral candidates at national laboratories have unparalleled access to cutting-edge research facilities like the Center for Neutron Scattering at Oak Ridge National Laboratory (ORNL), Los Alamos Neutron Scattering Center (LANSCE) at LANL, Advanced Photon Source (APS) at Argonne National Laboratory (ANL), National High Magnetic Field Laboratory (NHMFL) at LANL, National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory (BNL), and the DOE nanoscience research centers that serve as national user facilities at Lawrence Berkeley National Laboratory, Sandia National Laboratories/LANL, ANL, ORNL, and BNL. Several national laboratories operate supercomputers accessible to postdoctoral researchers.

Although postdoctoral programs are a prime source of staff hires at national laboratories, many postdoctoral candidates continue their careers in academia or industry. These programs are therefore providing hundreds of early career scientists the chance to broaden their technical expertise, gain perspective on how science addresses societal needs, and develop connections that will forge collaborations between national laboratories, academia, and industry. Through them, national laboratories are playing an increasingly important role in training a generation of scientists capable of solving the problems facing the world in decades to come, including the grand challenges of the energy sciences.

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