

**Final Report for
DOE Equipment Proposal (DE-FG02-04ER46177)
“Acquisition of an In-House X-ray Scattering Facility for Nanostructure
Characterization and Student Training”**

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This equipment grant was specifically dedicated to the development of a "state of the art" x-ray scattering facility. After a detailed competitive process a rotating anode Bruker AXS instrument was configured and purchased. The final purchase process for this equipment was very detailed and involved lengthy correspondence among Professor Schuller, the researchers in the lab, and Bruker AXS. Due to a variety of technical issues the instrument took much longer to become functional. Fortunately now the instrument is up and operational and producing state of the art data.

The availability of this equipment had a major impact on a large number of young students and postdocs and on many DOE funded projects. The very strongly materials based research underway at UCSD could not be pursued without the availability of such an instrument. In general terms there were two major areas, which were impacted by this instrument:

- 1) Materials synthesis in a variety of forms including bulk, thin film and nanostructured
- 2) Staging for synchrotron and neutron experiments at major DOE facilities

Project Impacted

The following DOE funded projects, were directly impacted by this instrument which was constantly used to forward the aims of these projects:

1. DOE DE-FG02-04ER46105
Title: Superconductivity and Magnetism in d- and f-electron Materials
2. DOE DE-NA0001841 (NNSA)
Title: Novel d- and f- Electron Materials under Extreme Conditions of Pressure, Temperature, and Magnetic Field
3. DOE Grant: DE-FG02-87ER-45332, University of California-San Diego
Title: Nanostructured Materials: from Superlattices to Quantum Dot
4. LANL subcontract No. 145509-1
Title: Molecularly Engineered Biomimetic Nanomaterials
5. DOE Grant: DE-FG02-04ER46173; subaward #20103329-01
Title: Dynamical Self-Assembly: constrained self-assembly and mesoscale dynamics in lipid membranes
6. DOE Grant: DSC0003678
Title: Neutron And X-ray Studies of Spin and Charge manipulation in Magnetic Nanostructures.

Personnel Impacted

This instrument had a major effect in the research of the three principal investigators for this project: Profs. I. K. Schuller, S. K. Sinha and M. B. Maple. In addition, Prof. E. E. Fullerton (also funded by DOE) group has been a sporadic user of this instrument.

Up to date, approximately 31 young researchers (students and postdocs) have been trained on X-ray diffraction methods and their research and/or PhD theses has benefited from using this instrument.