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## **Small-Angle X-ray Scattering (SAXS) and X-ray Reflectometry (XRR) at CNMS and NSD: Enabling Structural Characterization and X-ray–Neutron Synergy**

Small-Angle X-ray Scattering (SAXS) and X-ray Reflectometry (XRR) are powerful characterization techniques available at the Center for Nanophase Materials Sciences (CNMS) and the Neutron Scattering Division (NSD) at Oak Ridge National Laboratory (ORNL), enabling detailed nanoscale structural analysis of a wide range of materials. SAXS provides quantitative insights into the size, shape, and hierarchical organization of nanostructures in solution, bulk, and thin-film forms. XRR, in turn, probes electron (X-ray scattering length) density profiles and interfacial roughness in layered systems with sub-nanometer resolution. These complementary techniques are central to CNMS and NSD science in areas such as soft matter, hybrid interfaces, and quantum materials, and are broadly applicable to polymers, nanocomposites, biomaterials, and thin films. This presentation will highlight the SAXS and XRR capabilities and sample environments available across CNMS and NSD, with illustrative examples from user projects that demonstrate their scientific impact. Particular emphasis will be placed on the complementary nature of X-ray and neutron scattering techniques, and on the role of SAXS and XRR as high-throughput tools for early-stage structural screening prior to neutron experiments—specifically, small-angle neutron scattering (SANS) and neutron reflectometry (NR). These integrated approaches significantly enhance the efficiency, focus, and scientific return of subsequent measurements at the Spallation Neutron Source (SNS) and High Flux Isotope Reactor (HFIR), supporting streamlined and synergistic X-ray–neutron workflows for both CNMS and NSD users.

### **Topical Area**

Soft matter: polymers, and complex fluids

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