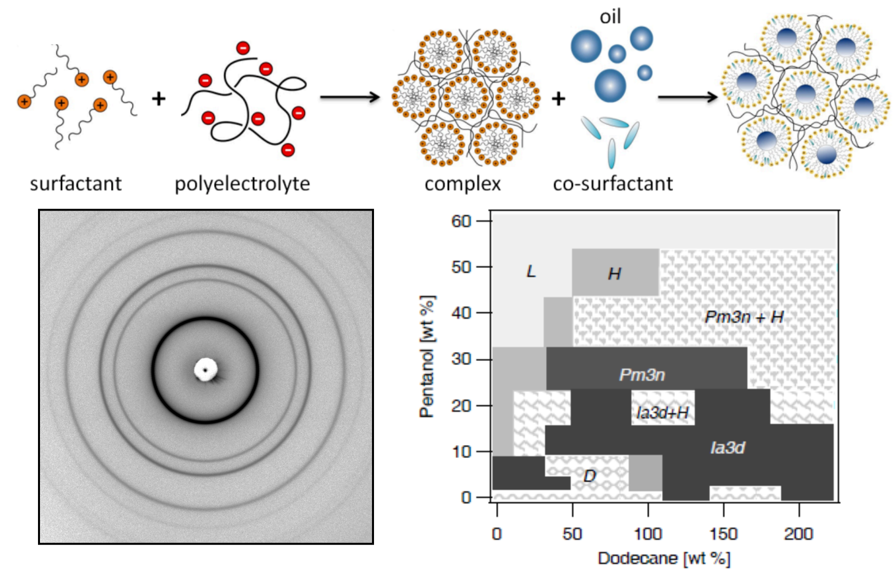
Complex Materials Scattering (CMS)

CMS at NSLS-II will provide

- High-throughput x-ray scattering for intelligent exploration of vast parameter spaces
- Versatility for stimuli-responsive and *in-situ* experiments
- Broad *q*-range to study complex, hiearchical, materials, including next-generation nanomaterials
- Microbeams for heterogeneous sample mapping

Examples of Science Areas & Impact

- SYNTHESIS: Using x-ray probes of structure to control reagent feeds, CMS will autonomously optimize synthesis
- POLYMERS: In-situ characterization of polymers under stress and flow will shed light on polymer crystallization
- DEVICES: Studies of stimulated and direct self-assembly, e.g. in DNA lattices or block-copolymer nano-lithography, will pave the way for next-generation device architectures
- ENERGY: CMS will enable detailed studies of high-performance materials for energy applications: e.g. organic solar cell materials and mesoporous structures for high-capacity batteries and supercapacitors



Surfactants and polyelectrolytes can form well-ordered complexes in solution (top). Scattering patterns (lower left) enable measurement of the lattice type, size, and order. Even with a small number of components, the phase diagram is prohibitively large and complex (lower right). These preliminary combinatorial measurements, conducted on X6B at NSLS , demonstrate the power of high-throughput techniques to characterize and understand multi-component systems. H. Strey (Stony Brook University) et al.

Beamline Capabilities

TECHNIQUES: wide-angle, small-angle, and ultrasmall-angle x-ray scattering (including reflection-mode)

ENERGY TUNABILITY: 5 – 20 keV

BROAD *Q*-RANGE: 4×10^{-4} Å^{-1} to 7.0 Å^{-1}

SOURCE: three-pole wiggler

U.S. DEPARTMENT OF ENERGY

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