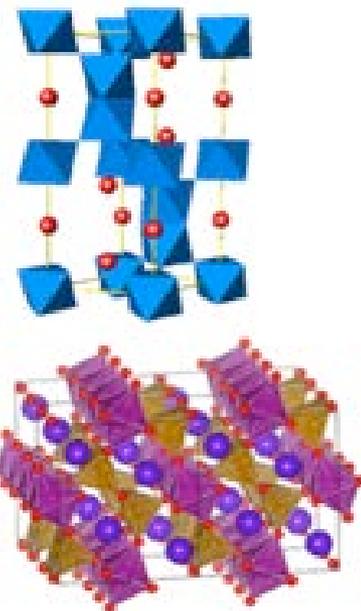
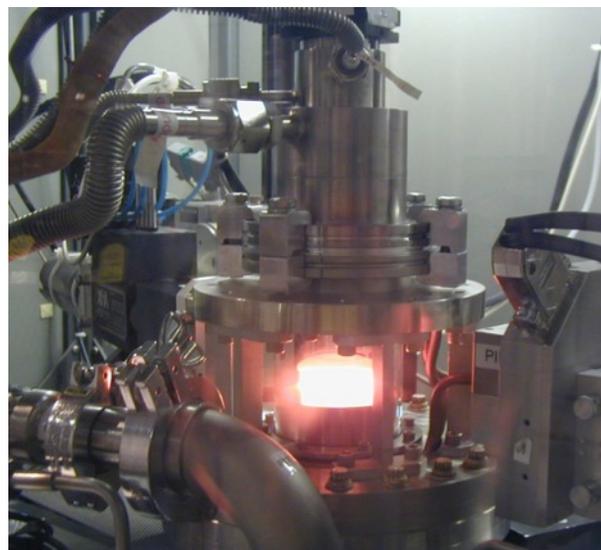


Welcome

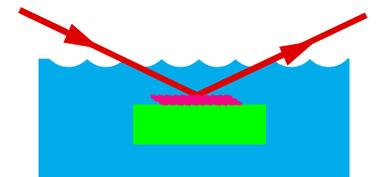
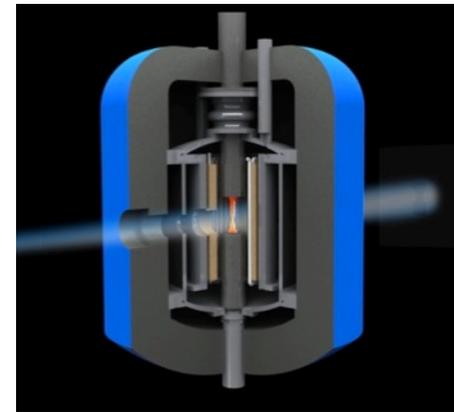
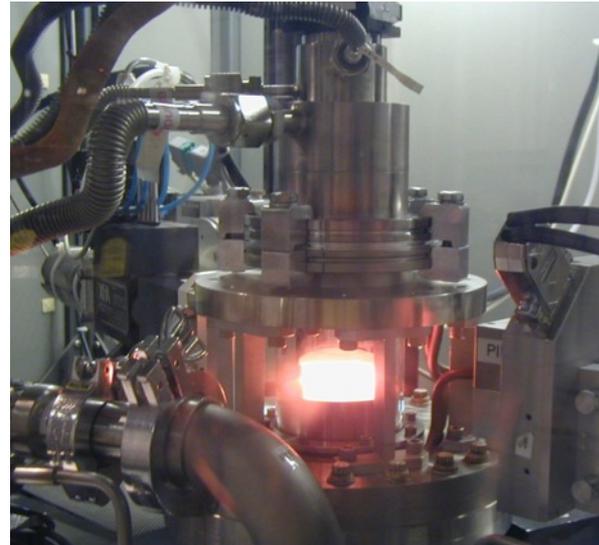
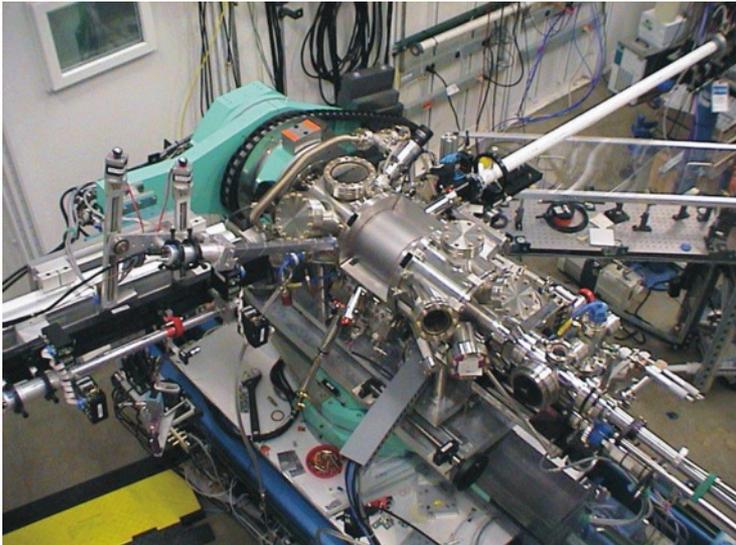
Brian Stephenson

XIS Workshop, January 10-11, 2012



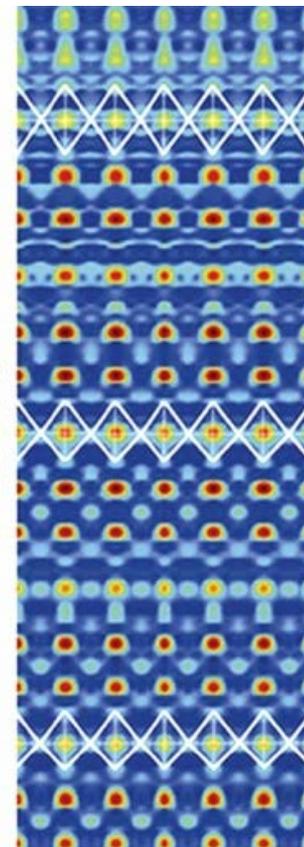
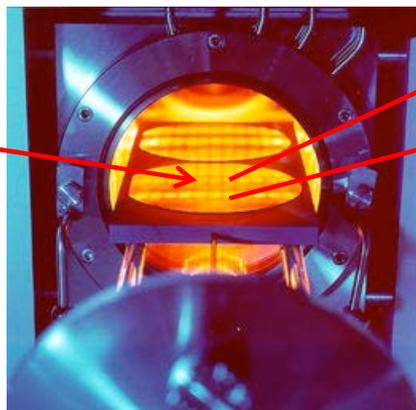
Major Scientific Theme of APS Upgrade

“Real materials under real conditions in real time”



XIS Sector Enables *In Situ* Studies of Materials Synthesis

- Development of synthesis methods for advanced materials with precisely controlled structure is currently a bottleneck because of the trial-and-error procedures typically used
- XIS sector provides a new facility using hard x-rays to penetrate real environments for an ***in situ*, real-time view of the atomic scale processes** occurring during materials synthesis and functioning
- Considering management of XIS as a partnership with a new Argonne institute that would provide a scientific home for long-term visitors, coupled to other advanced characterization and modeling techniques

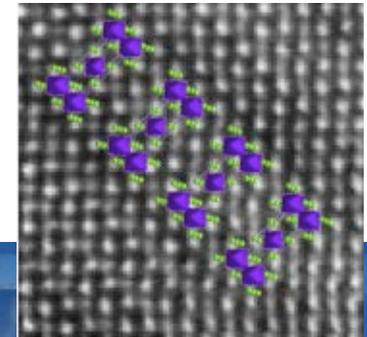
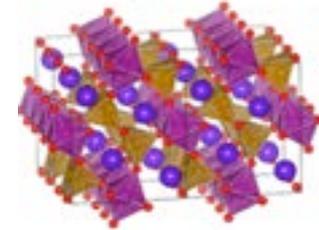
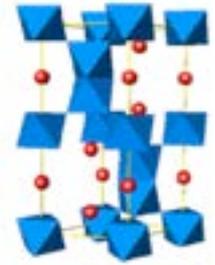
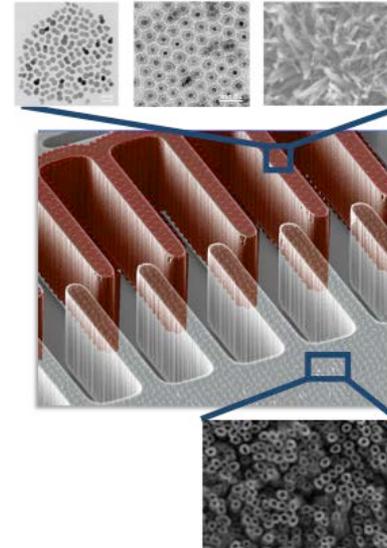


Materials for Energy Initiative at Argonne

Goal: Create completely new classes of materials by coordinating the science of synthesis with the science of function.

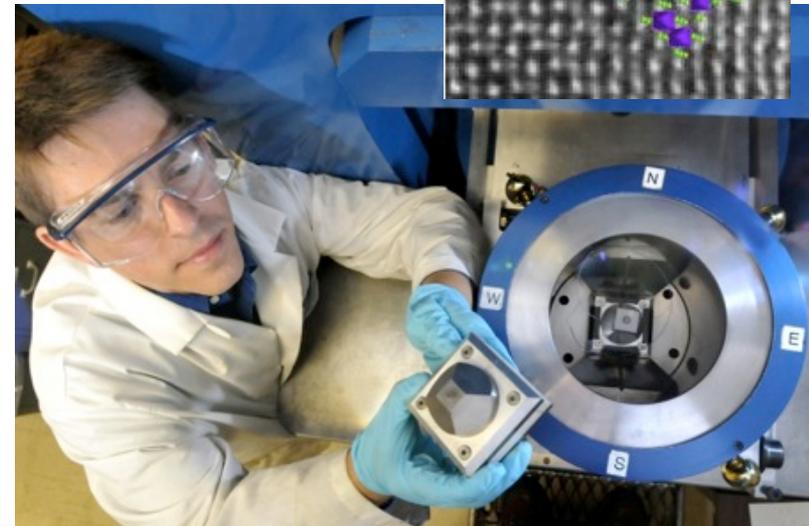
Approach:

- Materials design and synthesis
- Control and characterization using *in situ* monitoring of processing
- Accelerated materials discovery *via* high throughput computational design and modeling



Argonne Facilities Pathway

- Materials Design Laboratory
- APS Upgrade
- Computational Materials Science

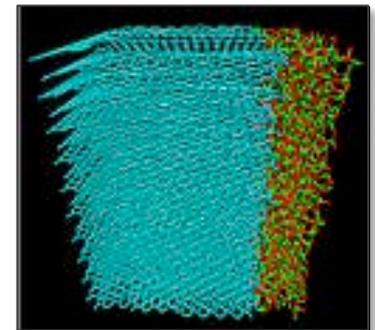
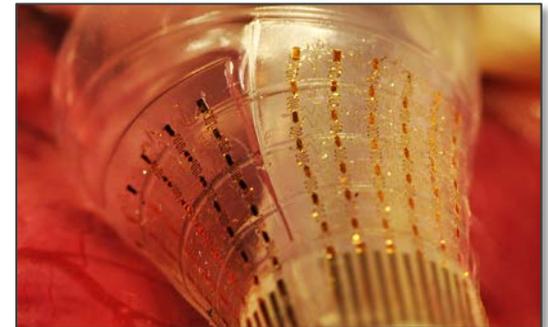


Materials for Energy

Three Emerging Themes

Move from *applied serendipity* to *materials by design* by leveraging:

- Center for Synthesis Science
 - Where to put the atoms ... and how to put them there
- Institute for Molecular Engineering
 - Soft and bio-inspired matter at the mesoscale
- Computational Chemistry and Materials
 - Quantum materials and mesoscale design



The Materials Design Laboratory



Principles and application of synthesis science will be developed and applied in the MDL, guided by computational design, and monitored by probes



Functional crystals and solids

Films as platforms for applications

Materials under extreme conditions

Designing and creating energy materials will require new experimental and computational methodologies



Potential Building for Materials Synthesis Institute



- Adjacent to XIS sector and CNM