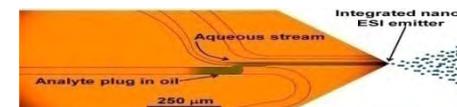


## Capability/Need

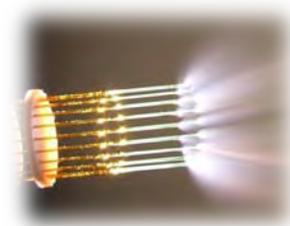
- **Transforms** EMSL's microfabrication capabilities
- Deep reactive ion etching system to reproducibly fabricate high-aspect-ratio microstructures with tight tolerances
- Multi-source sputter deposition system with *in situ* RHEED characterization for high quality thin film growth
- Direct-write lithography system to pattern features as small as 1  $\mu\text{m}$
- Thermal and UV nano-imprinting capability for replication of patterns in the  $\mu\text{m}$  to nm range



Mineral precipitation  
due to transverse mixing



Analyzing sub-nL biological  
samples by mass  
spectrometry



## Science/Users

### Micromodel Fabrication

- Subsurface Flow and Transport - Fate and transport of environmental contaminants, using microchannels and devices for modeling
- To investigate cellulose breakdown using microbial communities - Bioenergy
- To understand the gas hydrate formation/dissociation and distribution in the porous media - carbon sequestration

### Microfluidic Devices for Bioanalysis

- Integrated sample handling, separation and detection of biomolecules
- Separation and analysis of single cells
- Improved identification and quantification for proteomic analyses

## EMSL Strategy Alignment; Specifics

- Science themes: Biological Interactions/Dynamics; Geochemistry/Biogeochemistry and Subsurface Science; Science of Interfacial Phenomena
- Cross-cutting challenges: Static-Dynamics; Unprecedented Resolution; Design/Syn Complex Materials; Predict Biological Function; Linking Theory/Experiment; Bridging Scales
- EMSL capability area: Deposition and Microfabrication (Micro-Analytics)
- Anticipated availability: July 2010
- Technical POC: Ryan Kelly