Researchers across Kentucky are working at the nanoscale and making tremendous advances in biology, chemistry, physics, engineering, computer science and mathematics. Successful projects have already resulted in the design, modeling, and fabrication of unique nanoscale materials and devices. Kentucky’s leading nano research centers include the University of Kentucky’s Center for Nanoscale Science & Engineering (CeNSE) and University of Louisville’s ElectroOptics Research Institute and Nanotechnology Center (ERINC).

These institutions work both independently and collaboratively, including joint projects that span bio-engineering, pharmacy, medicine (nanosensors and nano-electrodes, and nanoparticle-based drug delivery), nano-templates for electronics and gas sensors (aligned carbon nanotube structures for gate-keeping), and opto-electronics (nano-structured displays).

**NanoCLEAR Anti-Reflective**
*Optical Dynamics, Louisville*

- Durable, polymer-based thin films containing nanoparticles
- Films bond to lenses while being light-cured in the store
- Process takes under an hour with no grinding or polishing
- Over 100 retail store systems across the nation have been deployed

**Nanotemplate Engineering™ Process**
*NanoMed Pharmaceuticals, Lexington*

- Rapid, reproducible and scalable process
- Produces nanoparticles without expensive equipment
- Can be as simple as mixing all ingredients and the drug in a single vessel
- Provides a sustained release of drugs in tissues
- May reduce dosage frequency, peripheral toxicity and adverse effects

**Ultimate Eco-Car: Fuel Cells based on Nanocatalysis**
*Toyota/University of Kentucky Collaboration*

- Advanced nanocatalyst systems drive cost reduction for hydrogen-powered fuel cell vehicles and portable devices
- Applications include PEM fuel cell systems
Nano-Docking Stations for Fuel Catalysts

- Nano-docking stations on carbon nanotubes host advanced fuel catalysts (~1-2 nm)
- Advanced fuel synthesis from biomass and coal-derived syngas
- Higher conversion efficiency and excellent stability reduce overall cost for synthetic fuels

Brush-On and Self-Assembled Nano-Fibers

- Tough, flexible polymer fibers form in seconds at room temperature
- Functionality added by macromolecular syntheses
- Applications include: nanodevices for fluidics, optics and mechanics

Nano-Needles

- Ag$_2$Ga as narrow as 25 nm form at room temperature
- Applications include: nanodevices for in-situ probing of cells and organelles, voltage-controlled actuators, and drug delivery

Displacement photocurrent nanostructure sensors

Applications:
- Tunable IR source, detector
- Stabilization element for laser diodes
- Materials identification and characterization
- High sensitivity strain monitoring
- High sensitivity gas detection

For more information, contact:
Robert W. Cohn, ERINC Director, 502-852-7077, rwcohn@UofL.edu
Vijay Singh, CeNSE Director, 859-257-3243, vsingh@engr.uky.edu