



ORNL NanoPhotonic Sensor Materials/Systems

Fluorescent nanoparticles – a tool for photonics on the nanoscale

The use of nanoparticles for sensing will grow as NEMs and MEMs systems proliferate.

Background

The luminescence properties of Rare-Earth doped compounds (as well as other solid state materials) find wide useage in display, communications, laser, and sensing and other applications. We utilize them extensively for thermometry purposes. We are now finding ways for exploiting them for various additional nanoscience and nanotechnology applications.

Applications

- Biological Infusion – These particles are small enough to be transported across the blood/brain barrier and could serve as sensing and drug delivery devices. Effective as probes for exploring *in vitro* models of novel neurosurgical therapies.
- Biomagnetic Applications
- Micro and Nanoscale Thermometry – nanophosphor fluorescence holds promise of making temperature measurements on the atomic scale of distances and exploring the limits of thermodynamics.
- Micro and Nanoscale Light Sources
- Tagging for biological and for security applications
- Tagging for Micromanipulation
- Display and Illumination

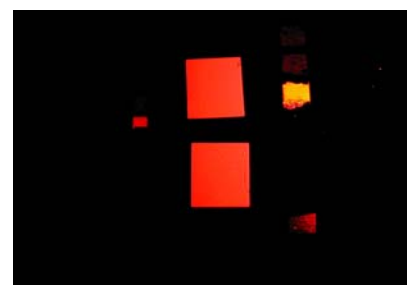
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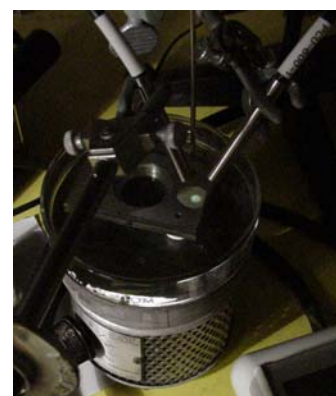
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Phosphor-coated substrates.



Fluorescing substrates.



Nanophosphor probed for temperature dependence.