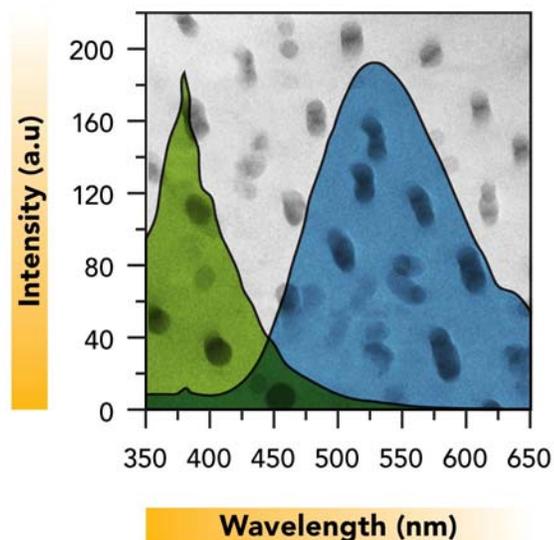


Nanoparticles Shine the Light on Cancer Cells

Collaborative team characterized coated water-soluble particles that may aid in treatment

Scientists from the University of Texas at Arlington, Pacific Northwest National Laboratory, and the University of Saskatchewan used expertise and instrumentation at the Department of Energy's EMSL to characterize the light-emitting properties of coated, water-soluble zinc oxide nanoparticles potentially useful in killing cancer cells. These particles could be targeted at malignant cells, followed by administration of X-rays that would cause the particles to glow. The light would activate a photosensitive chemical, also on the particles, that, in turn, would create energized oxygen that could destroy nearby cancer cells.

The team found that the particles' coating of polyethylene glycol biscalboxymethyl increased the particles luminescence intensity over a period of 50+ days. The resulting nanoparticles displayed increased luminosity relative to the uncoated water-soluble particles. The uncoated particles luminesce because of defects on the surface. The coating fills in these defects, allowing the particles to rely on a different method of luminescence. This pathway is known as band-edge states. This characterization was done using the laser-based fluorescence spectrometer facilities at EMSL. The light from these particles can be used as part of an innovative treatment for deep tissue cancers, such as breast cancer.



The coating on the water-soluble zinc oxide particles allows them to deliver bright light for more than 7 weeks.

Scientific impact: This is basic research that furthers an understanding of the interactions of nanoparticles and their surroundings. This is part of EMSL's ongoing work to characterize particles with unprecedented spatial resolution.

Societal impact: This research provides insights into biomedical uses of nanoparticles, such as treating malignant tumors.

For more information, contact EMSL Communications Manager Mary Ann Showalter (509-371-6017).

Reference: Woo BK, W Chen, AG Joly, and R Sammynaiken. 2008. "The Effects of Aging on the Luminescence of P5EG-Coated Water-Soluble ZnO Nanoparticles Solutions." *Journal of Physical Chemistry C* 112(37):14292-14296. doi: 10.1021/jp803649k

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