Lighting up cancer cells to identify low concentrations of diseased cells

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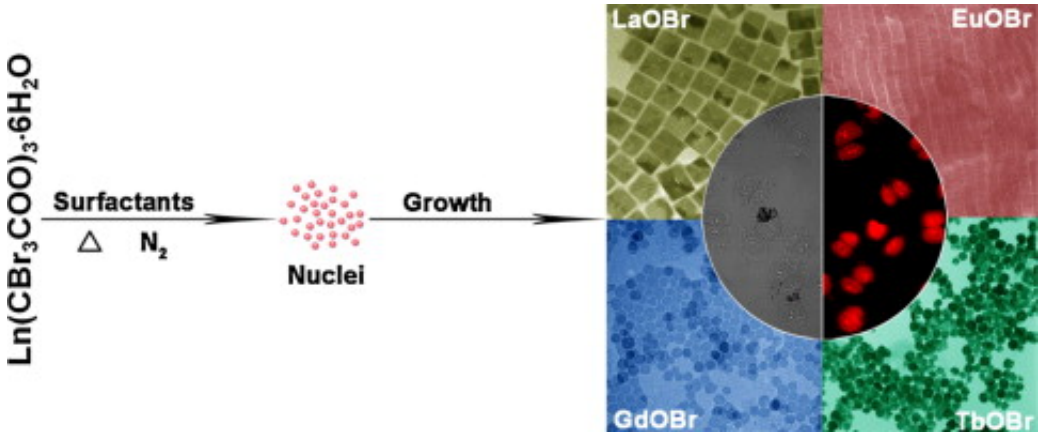

Researchers in China have developed tiny nanocrystals that could be used in the next generation of medical imaging technologies to light up cancer cells. In a study published in the inaugural issue of the journal *Applied Materials Today*, a new rapid, online only publication, the team of researchers describe how they make these films which are based on the heavy metals lanthanum and europium.

Dr. Yaping Du of Xi'an Jiaotong University, China, and colleagues have developed a way to make high-quality nanocrystals of lanthanide oxybromides, where the lanthanide metal can be lanthanum, europium, gadolinium or terbium. They produce the materials by heating a readily available precursor material, which also allows them to incorporate triply

charged europium ions, Eu3+, as "dopants" into any of the LaOBr nanocrystals.

In the study team explains that their process allows them to very precisely control the exact size and shape of the nanocrystals and it is this that allows them to fine tune the color of the light these materials produce when stimulated with ultraviolet light or electricity. Their tests with transmission electron microscopy on the nanocrystals, which form as ultrathin films, plates and tiny particles, reveal the desired quality and uniformity. X-ray crystallography and ultraviolet spectroscopy provide additional detailed evidence about the internal structure of the nanocrystals at the atomic level.

Once they had established the chemical and physical details about the nanocrystals, the team then tested the particles as "staining" agents on a tissue sample containing liver cancer cells held on a microscope slide. They found that these diseased cells could take up the nanocrystals, whereas healthy cells do not; they preferentially "stain" the cancer cells, which can clearly be seen under the microscope through their bright luminescence. Such targeting and ease of identification of cancer cells could allow oncologists to spot even tiny numbers of diseased cells in a biopsy sample.

The team also suggests that the bright luminescence of their lanthanide oxybromides might also be used in low-energy lighting applications as an alternative to compact fluorescent bulbs and light emitting diodes (LEDs).

"The results reported by Du et al could have significant impact on the fields of nanomaterials for medical imaging and lighting," says Prof Manish Chhowalla of Rutgers University, and Editor-in-Chief of *Applied Materials Today*. "We are pleased that the authors have chosen *Applied Materials Today* to publish their work; since its launch several months

ago the journal has received very high quality papers for review and hope to see this trend continue."

More information: "Synthesis of High-Quality Lanthanide Oxybromides Nanocrystals with Single-Source Precursor for Promising Applications in Cancer Cells Imaging" by Dong Yan; Bo Lei; Bo Chen; Xuejun Wu; Zhengqing Liu; Na Li; Juan Ge; Yumeng Xue; Yaping Du, Ph.D; Zhiping Zheng; Hua Zhang. It is published online in *Applied Materials Today*. www.sciencedirect.com/science/ … ii/S2352940715000025

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