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Gold/Copper Sulphide core/shell nanoparticles for Photothermal Therapy SANTANA BALA LAKSHMANAN, XIAOJU ZOU, WEI CHEN, The University of Texas at Arlington, NANO-BIO PHYSICS GROUP, THE UNIVERSITY OF TEXAS AT ARLINGTON TEAM — One of the biggest successes in photothermal therapy (PTT) is the use of gold (Au) nanoparticles. But its disadvantage is that it is too expensive and in addition the NIR absorption in gold nanostructures is from surface plasmon resonance which is dependent on the dielectric constant of the surrounding matrix. Thus the plasmon absorption maxima would shift for in-vivo observations compared to in-vitro. Alternatively, Copper sulphide (CuS) nanoparticles, developed recently, have also been used for PTT. Their advantage over gold nanostructures is that they have NIR absorption around 1100 nm which originates from the d-d transition of Cu²⁺ ions unlike surface plasmon resonance in gold nanostructures. Therefore, in this paper, we combined the above two nanoparticle systems and developed a new type of agent -Gold/Copper Sulphide (Au/CuS) core/shell nanostructure that has better photothermal conversion efficiency and also overcomes the limitations of the existing nanoparticle systems for PTT. The TEM results confirmed the core/shell structure of Au/CuS nanostructures. From UV-Vis-NIR spectrometer we obtained that these core/shell nanostructures have maximum absorbance at 1100 nm and absorption intensity much higher than only Au and only CuS nanoparticles systems. This, in turn attributed to the relatively high photothermal conversion efficiency of Au/CuS nanostructures.

Santana Bala Lakshmanan
The University of Texas at Arlington

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