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Plasmonic nanostructures for imaging and targeting drug delivery

Engineering a compact, near-infrared plasmonic nanostructure with integrated image enhancing agents for combined imaging and therapy is an important nano-medical challenge. To overcome this challenge we designed a nanostructure with NIR plasmonic signatures composed of a 50 nm Au core surrounded a SiO_2 inner-shell doped with contrast agents and an outer Au shell. The plasmon resonance of this nanostructure known as a nano-Matryoshka (NM), can be tuned to the desired wavelength by varying the thickness of the layers. The encapsulated contrast agents used in this study are Fe(III)-DOTA, Gd(III)-DOTA and fluorescent dyes. The Fe(III)-NM based contrast agents are found to have relaxivities two times greater than the widely used Gd(III)-DOTA, providing a practical alternative for T1 MRI contrast agent that eliminates Gd(III) patient exposure entirely. Additionally, the internalization of fluorescent dyes and MRI contrast imaging agents within the NM substantially reduces the toxicity while maintaining a free nanoparticles surface for further bio-functionalization.

Biography

Oara Neumann is the Peter M and Ruth L Nicholas Research Scientist at Rice University (a fully funded, endowed research scientist position at the university). She has completed her PhD and Postdoctoral study in Applied Physics at Rice University, MSc in Chemical Physics at Weizmann Institute of Science, Israel and another MSc in Analytical Chemistry from Bucharest University, Romania. She is the Pioneer of nanoparticle-based solar thermal applications. She holds several patents and has published more than 25 refereed articles and has an h-index of 16.

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