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Enhancing T1 MRI contrast using gadolinium(III) in a multilayer nanoparticle

Oara Neumann
Rice University, USA

Multifunctional plasmonic nanostructures have enormous potential in the treatment of solid tumors; however, tracking particles with drug cargo and triggering the release of the cargo in mapped tumors is still impossible. To overcome this challenge, we have developed an MRI active nanostructure called Gd-nanomatryoshka (Gd-NM). This new structure is composed of a 50 nm Au core surrounded by a Gd(III)-DOTA chelate doped SiO2 inner-shell and an outer Au shell. The experimental results demonstrates an enhanced T1 relaxation (r_1~24 mM^{-1} s^{-1} at 4.7 T) compared to the clinical Gd(III)-DOTA chelating agents (r_1~4 mM^{-1} s^{-1}). This multifunctional nanosystem increases MRI sensitivity by concentrating Gd(III) ions into the Gd-NMs, reduces the potential toxicity of Gd(III) ions by preventing their release *in vivo* through the outer Au shell protection, and the terminal gold layer surface can then be functionalized to increase cellular uptake, circulation time, or thermal drug-release properties.

Biography

Oara Neumann completed her MS at Weizmann Institute of Science, Israel; PhD at Rice University and; Post-doctoral studies at Rice University. She is a Scientist in Naomi Halas Group at Rice University. She has published more than 25 papers in reputed journals.

Oara.Neumann@rice.edu

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