Core/shell silica-based porous nanomaterials for targeted cancer treatment and imaging

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The properties of core/shell analogues of mesoporous silica nanoparticles (MSN) and periodic mesoporous organosilica (PMO) allow versatile possibilities for construction of efficient cancer-targeting nanotheraanostics. The materials typically contain superparamagnetic iron-oxide nanoparticles (SPION) or quantum dots (QD) as the core and mesoporous silica and organosilica shell. The materials exhibit high surface areas, structured porosity, high biocompatibility and various possibilities for surface functionalization. Hence, different cancer-targeting nanomaterials can be constructed, having stimuli-responsive cancer treatment capabilities and functionalized surface for cancer targeting, supported by core nanoparticles for magnetic targeting and magnetic resonance imaging (in case of SPION-core) or fluorescence imaging (in case of QD-core). This talk will give an overview of different composition and morphologies of constructed core/shell mesoporous silica and organosilica nanostructures. SPION-containing MSNs and PMOs, as well as core/shell PMO nanoparticles containing core nanodiamond nanoparticles will be presented, evidencing their applicability for targeted cancer therapy and imaging.