BME 695 Engineering Nanomedical Systems
September 13, 2011

Lecture 5: Nanomaterials for core design

5.1. Introduction
- 5.1.1 core building blocks
- 5.1.2 functional cores
- 5.1.3 functionalizing the core surface

5.2 Ferric oxide cores
- 5.2.1 paramagnetic cores
- 5.2.2 superparamagnetic cores
- 5.2.3 ferric nanorods
- 5.2.4 advantages and disadvantages

5.3 C60 and carbon nanotubes
- 5.3.1 size and structure of C60
- 5.3.2 elongation of C60 into carbon nanotubes
- 5.3.3 advantages and disadvantages

5.4 Gold cores
- 5.4.1 gold nanoparticles
- 5.4.2 gold nanorods
- 5.4.3 other shapes (e.g. "stars")
- 5.4.4 gold nanoshells
- 5.4.5 advantages and disadvantages

5.5 Silica cores
- 5.5.1 silica nanoparticles
- 5.5.2 mesoporous silica NP for drug delivery and biosensing
- 5.5.3 advantages and disadvantages

5.6 Quantum dots
- 5.6.1 size determines color!
- 5.6.2 good for multicolor fluorescence
- 5.6.3 importance of coatings
- 5.6.4 conjugating targeting molecules
- 5.6.5 examples from studies
- 5.6.6 finding sub-optical nanoparticles
- 5.6.7 cytotoxicity issues

5.5. Next generation quantum dots
- A. Water-Soluble Doped ZnSe Nanocrystal Emitters
- B. Organic quantum dots

5.8 Hybrid materials
- 5.8.1 gold-ferric oxide nanoparticles and nanorods
- 5.8.2 NIR fluorescent-chitosan polymer-iron oxide core hybrids
- 5.8.3 dual-modality MRI/NIRF imaging with hybrid nanoparticles

Lecture 5 References

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