

Development of Nanomaterials for Imaging Guided Therapy of Cancer

Yongfeng Zhao

Department of Chemistry and Biochemistry, Jackson State University

Nanomaterials have been intensively studied for diagnosis and therapy of diseases. After forming a formula in nanoscale, the pharmacokinetics property of the drug will be significantly different. For example, nanomaterials usually show longer blood circulation due to evasion of renal clearance from blood system. Because of comparable small size with biomolecules (e.g. DNA, antibody), nanomaterials have chance to interact with biomolecules on the surface and/or inside of the cells. On the other side, the size of nanoparticles is bigger than that of small molecules, so nanoparticles can be integrated simultaneously with components such as imaging and therapeutics. Most interestingly, nanomaterials can be engineered to favor the targeted cells by attaching a homing group or changing shape and surface charges. As result, nanoparticles hold promises as platform for “magic bullet”, killing targeted cells and leaving other cells unaffected.

Assistant Professor
Department of Chemistry and Biochemistry
Jackson State University
Jackson, MS 39217
Tel: 601-979-3490, E-mail: yongfeng.zhao@jsums.edu



in Chemistry, Peking University, Beijing, China 2005
Advisor: Professor Qifeng Zhou
in Chemistry, Lanzhou University, Lanzhou, China 1999

- *Assistant Professor, Department of Chemistry and Biochemistry, Jackson State University* 2015-present
- *Staff Scientist, School of Medicine, Washington University in St Louis,* 2012-2015
- *Postdoctoral Research Fellow, Department of Bioengineering, University of California, Riverside,* 2006-2011
- *Research Assistant, College of Chemistry and Molecular Engineering, Peking University,* 2000-2005

1) Design, synthesis and characterization of multifunctional small molecules and polymers for surface functionalization.

2) Development of organic, inorganic and organic-inorganic hybrid nanomaterials with controlled sizes and functions by green chemistry.

3) Application of bioconjugation / nanomaterials as chemical tools for imaging, diagnostics and therapy of human diseases like cancer.

Panelist, National Science Foundation (NSF) 2017, 2018, 2019

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