BIOGRAPHICAL SKETCH

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NAME: Tong, Sheng

eRA COMMONS USER NAME (credential, e.g., agency login): SHTONG

POSITION TITLE: Associate Research Professor, Department of Bioengineering, Rice University

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Science and Technology of China, Hefei, China	B.S.	07/1995	Fluid mechanics
Peking University, Beijing, China	M.S.	07/1998	Biofluid mechanics
Duke University, Durham, NC	Ph.D.	05/2003	Biotransport/Drug delivery
University of California, San Diego	Postdoctoral	03/2006	Microcirculation

A. Personal Statement

I am an associate professor in the Department of Biomedical Engineering at the University of Kentucky. I have an extensive background in nanomedicine, tumor imaging, biotransport, and drug delivery. My early research was focused on developing a magnetic iron oxide-based nanoplatform that combined MRI, fluorescence imaging and positron emission tomography for diagnostic imaging. I have collaborated with many other researchers on the synthesis of composite nanomaterials for theranostic applications such as multimodality imaging and image-guided drug delivery. My current research is focused on studying the interaction of magnetic nanomaterials with biological systems at the molecular and cellular levels and utilizing nano-mechanics and nano-heating to formulate innovative therapeutic approaches for cancer treatment.

B. Positions and Honors

Positions and Employment

2006-2015 Research Engineer, Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA

2015-2019 Associate Research Professor, Department of Bioengineering, Rice University, Houston, TX

2019-present Associate Professor, Department of Biomedical Engineering, University of Kentucky, Lexington, KY

Other Experience and Professional Memberships

2012-present Member, Biomedical Engineering Society

2016-present Member, American Society of Mechanical Engineers

Honors and Awards

1993 Excellent Student Scholarship, University of Science and Technology of China

1995 Excellent Graduate Award, University of Science and Technology of China

1996 Excellent Student Scholarship, Peking University

2014-2015 Gandy Diaz Teaching Fellow, Georgia Institute of Technology

C. Contributions to Science

1. My current research is focused on investigating the interactions between magnetic nanomaterials and biological systems and utilizing gained knowledge to develop therapeutic approaches for cancer treatment. I have studied various forms of cancer thermal therapies including magnetic nanoparticle heating, photothermal therapies and drug delivery with thermos-sensitive liposomes. My studies have elucidated the effects of magnetic force on the endocytosis of nanoparticles, the structure of cytoskeleton and the regulation of intercellular junctions. I have developed innovative strategies for remote control of vascular permeability for targeted drug delivery and focal activation of viral transduction for *in vivo* genome editing.
   a. Haibao Zhu*, Linlin Zhang*, Sheng Tong*, Ciaran Lee, Harshavardhan Deshmukh and Gang Bao. Spatial control of in vivo CRISPR/Cas9 genome editing via nanomagnets. Nature Biomedical Engineering. 3, 126-136, 2019. PMID: 30944431
   b. Tong S, Quinto C, Mohindra P, Zhang L, Bao G. Size-Dependent Heating of Magnetic Iron Oxide Nanoparticles. ACS Nano. 11, 6808–6816, 2017. PMID: 28625045
   c. Qiu Y*, Tong S*, Zhang L, Sakurai Y, Myers D, Hong L, Lam W, Bao G. Magnetic forces enable controlled drug delivery by disrupting endothelial cell-cell junctions. Nature Communication. 8, 15994, 2017. PMID: 28593939.
   d. Ma Y*, Tong S*, Bao G, Gao C, Dai Z. Indocyanine green loaded SPIO nanoparticles with phospholipid-PEG coating for dual-modal imaging and photothermal therapy. Biomaterials. 34, 7706-7714, 2013. PMID: 23871538.

   * Equal contribution.

2. I have extensive experience in the synthesis and characterization of magnetic nanoparticles and composite nanomaterials. I have also studied the application of these nanomaterials in *in vitro* diagnostic assays, molecular imaging, and drug delivery.
   a. Tong S, Ren B, Zheng Z, Shen H, Bao G. Tiny grains give huge gains: nanocrystal-based signal amplification for biomolecule detection. ACS Nano. 7, 5142-5150, 2013. PMID: 23659350.
   b. Qu H, Tong S, Song K, Ma H, Bao G, Pincus S, Zhou W, O'Connor C. Controllable In-Situ Synthesis of Magnetite Coated Silica-Core Water-Dispersible Hybrid Nanomaterials. Langmuir. 29, 10573-10578, 2013. PMID: 23889037.
   c. Tong S*, Hou S*, Zheng Z, Zhou J, Bao G. Coating optimization of superparamagnetic iron oxide nanoparticles for high T2 relaxivity. Nano Letters. 10, 4607-4613, 2011. PMID: 20939602.
   d. Tong S*, Hou S*, Ren B, Zheng Z, Bao G. Self-assembly of phospholipid-PEG coating on nanoparticles through dual solvent exchange. Nano Letters. 11, 3720-3726, 2010. PMID: 21793503.

3. In addition to the contributions described above, I have studied bio-transport in solid tumors in the following directions: the morphogenesis of tumor vascular network, interstitial/intratumoral transport of small molecules and polymeric drug carriers, and thermos-sensitive liposomes.
   a. Tong S, Yuan F. Dose response of angiogenesis to basic fibroblast growth factor in rat corneal pocket assay: I. Experimental characterizations. Microvascular research. 75, 10-15, 2008. PMID: 17706726.
   b. Tong S, Yuan F. Dose response of angiogenesis to basic fibroblast growth factor in rat corneal pocket assay: II. Numerical simulations. Microvascular research. 75. 16-24, 2008. PMID: 18031768.
   c. Chen Q, Tong S, Dewhirst MW, Yuan F. Targeting tumor microvessels using doxorubicin encapsulated in a novel thermosensitive liposome. Molecular Cancer Therapeutics. 3, 1311-1317, 2004. PMID: 15486198.
   d. Tong S, Yuan F. Numerical simulations of angiogenesis in the cornea. Microvascular research. 61, 14-27, 2001. PMID: 11162192

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/sites/myncbi/1pQKoicL5cl/bibliography/41101421/public/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

ACTIVE

Rice Cayuse ID 17-1104 (West, PI) 07/01/2018 – 12/31/2019

RSNA / Emory University

Optimization of Electroporation-Assisted Nanoparticle Uptake in a Pancreatic Nude Mouse Model

The proposed work aims to develop an electroporation-assisted MNP delivery method for pancreatic cancer. I will be serving as the subcontract PI for this proposal. We will synthesize MNPs with different sizes and targeting ligands and co-design the experiments to optimize the electroporation conditions for the optimal delivery of MNPs in vitro and in vivo in collaboration with Dr. Derek West at UT Health. In addition, we will test magnetic heating of tumor tissues loaded with MNPs to support proof of principle for this delivery strategy.

Role: Principle investigator (subcontract)

1R01EB026893-01A1 08/21/2018 – 05/31/2022

NIH/NIBIB

Controllable In Vivo Genome Editing for Immune-Checkpoint Blockade in Solid Tumors

The proposed work aims to develop a hybrid nanoparticle-viral vector system for controlled delivery of engineered nuclease, CRISPR/cas9, which induces multiplexed gene deletions in the immune checkpoint pathways in the tumor tissue. The success of this project will provide a highly integrated, efficient and versatile immunotherapy, in which the genetic targets can be readily designed and implemented according to the immunological profile of individual cancer patients.

Role: Principle investigator

N6600119C 03/25/2019 – 03/24/2023

DARPA

MOANA: Magnetic, Optical, and Acoustic Neural Access device, for High-bandwidth, non-surgical brain computer interfaces

The proposed work aims to provide a high-bandwidth brain-computer-interface without the need for a surgically implanted device.

Role: Co-investigator