CHEMICAL ENGINEERING

DISTINGUISHED YOUNG SCHOLARS SERIES

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Magnetic Particles Imaging (MPI) for Early Disease Diagnosis

ABSTRACT: Magnetic particle imaging (MPI) is a recently developed bio-imaging technique that seeks to provide ultra-high resolution imaging and tracer sensitivity with positive contrast, directly originated from its contrast agents. Here, I will discuss nanomedicine-based approaches, that I have developed to resolve critical challenges against clinical translation of this technique for early detection of several fetal diseases. First, I will address strategies to synthesize functionalized MPI contrast agents and discuss the effects of NPs characteristics on their circulation time in blood and their body clearance through macrophage-monocytes system (e.g. liver, spleen) and kidneys. To address these in animal models, we labeled our optimized MPI contrast agents with radioactive ^{68}Ga and near infra-red fluorescent (NIRF) molecules and used simultaneous MRI, PET and fluorescent imaging to analyze our tissue targeted MPI results. I will show that the spatial resolution and signal intensity of the MPI images are highly dependent on NPs immobilization and degradation, using brain-cancer targeted MPI. In addition, I will discuss a MPI-based procedure that we developed for highly sensitive detection of the specific proteases secreted from pancreatic cancer cells, which can play a leading role for early diagnosis of this fatal disease in a near future. These results are breakthroughs toward the future clinical applications of MPI for cancer diagnosis and neuro-imaging.

LECTURE 4:00 – 5:00 (PAA) A110
Happy Hour in Benson Hall Lobby Following

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BIOGRAPHY: Hamed Arami is a NIH (T32) post-doctoral fellow at Stanford Cancer Imaging Training (SCIT) program. He is working in Prof. Gambhir's lab, investigating advancements at the interface of nanomedicine and cancer diagnosis and treatment. He received his Dual PhD in 2015, in Materials Science (MSE) and Nanotechnology and Molecular Engineering (NTME) from UW, in Prof. Krishnan's lab. He received MRS Graduate Students and NSF Future Faculty awards in 2016 and 2013. His research interests are development and clinical translation of advanced biomaterials (nanoparticles, hydrogels and scaffolds) and using novel technologies for biomedical imaging, targeted therapy, tissue engineering and regenerative medicine.