



Northeastern University

College of Engineering

Please join us for a
Special Chemical Engineering Seminar

Wednesday, December 4, 2013
108 Snell Engineering Center
11:45 am – 1:25 pm

“Nanoplatfoms for Precision Medicine”



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ABSTRACT

Biocompatible nanomaterials are key components of novel approaches to addressing the major problems of disease diagnosis and therapy for personalized medicine. We have developed several nanoplatfoms that offer potential for significant improvements in multi-modal imaging and targeted delivery of therapeutics. Theranostic nanoplatfoms combine multiple functionalities including multi-modal imaging using MRI, SPECT and FMT, magnetic targeting to the disease site, delivery of the drug payload through sustained as well as triggered drug release. We have developed a new approach to chemoradiation therapy (CRT), termed Biological In-Situ Image Guided Radiation Therapy, that involves the coating of spacers routinely used during radiation therapy with nanoparticles that release radiosensitizing drugs (e.g. docetaxel DTX for Prostate Cancer), that is synchronized with the radiation therapy schedule, with almost no systemic toxicity. This new nanoparticle approach is an exciting new combinatorial therapy for cancer as well as other diseases where image-guided radiation therapy is currently a preferred choice of treatment. We have recently prepared injectable nanoformulations of poorly soluble PARP inhibitors for blocking DNA repair in a variety of cancers. Combination platfoms with DNA damaging agents (cisplatin) have also been developed. The nano-PARPi formulation acts as a chemo and radio-sensitizer enabling several therapeutic approaches for personalized medicine: MonoTherapy (PARPi only), Combination ChemoTherapy (PARPi + Pt), and Chemo-Radiation Therapy (PARPi + Pt + radiation). Multi-modal nanoplatfoms incorporating MR, SPECT, optical and PET imaging moieties, as well as chemotherapeutics, have been developed. The iron oxide nanoparticles incorporated in the nanoplatfoms have been used to demonstrate novel positive contrast MR imaging, and on-demand triggered release of chemotherapeutics. These nanoplatfoms have been shown to enable quantitative image-guided drug delivery.

BIOGRAPHY: Dr. Srinivas Sridhar is Arts and Sciences Distinguished Professor of Physics, Bioengineering and Chemical Engineering at Northeastern University, and Lecturer on Radiation Oncology, Harvard Medical School. He is the Director and Principal Investigator of Nanomedicine Science and Technology, an IGERT (Integrative Graduate Education and Research Training) program funded by the National Cancer Institute and the National Science Foundation. He is the founding director of the Electronic Materials Research Institute, an interdisciplinary center with research and education thrusts in nanophotonics and nanomedicine. From 2004 to 2008 he served as Vice Provost for Research at Northeastern University, overseeing the University's research portfolio. An elected Fellow of the American Physical Society, Sridhar's current areas of research are nanomedicine and nanophotonics. His paper in Nature in 2003 was listed among Breakthroughs of 2003 by the journal Science. He has published more than 175 articles on his work in nanomedicine, nanophotonics, metamaterials, quantum chaos, superconductivity and collective excitations in materials. For more information, visit www.igert.neu.edu and sagar.physics.neu.edu.

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