Northeastern University
College of Engineering

National Engineers Week 2020

PIONEERS OF PROGRESS

GUEST SEMINAR

PHOTOCHEMISTRY AS A TOOL FOR IMAGING, PRIMING AND THERAPY

WEDNESDAY FEBRUARY 20, 2020
11:45AM - 1:25PM

236 RICHARDS HALL

HOSTED BY
The Department of Chemical Engineering

ABOUT

Optical activation of materials leads to thermal, photochemical and radiative processes which can be captured for response-based therapeutic design. The ability to use light as a reagent to control drug release further allows for the fabrication of light controllable intelligent multiagent constructs that attack multiple pathways making the nanomedicines more effective against cancer. Combination therapy is a fairly well accepted standard for cancer treatment and management of other diseases. Typically, these are administered separately with their own pharmacokinetics, hitting targets at different times which reduces the synergism potential. Nanomedicines, to some extent can overcome this limitation by delivering the multiple agents to the target site at the same time provided there is synergism in any aspect of the agents. Photodynamic therapy (PDT) is a photochemistry-based process that is approved for several clinical applications world-wide. It involves the exposure of light activatable molecules to appropriate wavelengths that leads to the generation of active molecular species that is responsible for targeted death. There are many unique attributes to this process. Because of the requirement of light and the photosensitizer being present at the same place at the same time there is an additional level of selectivity. Neither light alone nor the photosensitizer have an effect on target cells by themselves. In addition to the direct cytotoxic effect, the photodynamic activation primes the microenvironment in a process call PhotoDynamic Priming (PDP) to enable a more potent response to conventional treatments so the PDP becomes an enabler of other treatments, particularly when administered in a Nanoplatform. Strategies for syntheses and applications in biology and medicine will be discussed.

BIO

Tayyaba Hasan, Ph.D., is a Professor of Dermatology at Harvard Medical School and is a Professor at the Harvard-MIT Division of Health Sciences and Technology. She is a leader in photochemical approaches to treatment and diagnosis using targeted strategies and incorporating nanotechnology. She is an inventor of the FDA approved photodynamic treatment of the leading cause of blindness in the western world, Age-Related Macular Degeneration used in millions of treatments. Her impact on Global Health includes two of her inventions of simple, smart phone-based, low-cost devices, which are being evaluated in clinical studies for treatment of oral cancer and antibiotic identification, in India and Thailand respectively. In recognition of her translational work and innovations she was the recipient of the NIH's Pioneer Award in Biomedical Optics, Bench to Bedside Translation. She was awarded the Britton Chance Biomedical Optics Award in recognition of trailblazing contributions to the field of Photodynamic Therapy, clinical translation and leadership to the photonics community. She has received four Lifetime Achievement awards from leading scientific organizations including the International Photodynamic Association. She has approximately 300 publications and has 12 US issued patents. She leads 2 multicenter international NCI funded programs for developing and translating innovative treatments of oral, pancreatic and skin cancers.

Dr. Tayyaba Hasan, Professor