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Biomedical Sciences Research Building
Kahn Auditorium**

Biomimetic Approaches to Modulating the Immune Response with Biodegradable polymers

Abstract:

Modulating immune responses to pathogen invasion and even tumors is a major goal in immunotherapy. T cells play a central role in these responses. Progress towards that goal is accomplished by stimulating the antigen-specific T cell immune response *in vivo* through active immunization, or by re-transfer of large numbers of T cells expanded outside the body in a process called adoptive immunotherapy. In both vaccination and adoptive cellular therapy, there is a critical need for a reliable and effective antigen-presentation strategy that stimulates T cells in specific and efficient manner. Biodegradable polymers can be engineered into particulate formulations on the nanoscale for priming dendritic cells for improved immunization or made to approximate the natural ability of dendritic cells in stimulating T cells by surface modification with the appropriate T cell antigens. Here we show how these polymers and their formulations can be employed to produce biomimetic features that induce safe and effective immunotherapeutic responses. We also demonstrate how these systems can be designed for delivery of combination of agents that break tumor immune tolerance and activate both innate and adaptive immune responses for effective treatment modalities.

Biography:

Dr. Fahmy graduated from the University of Delaware Chemical Engineering Dept. and worked with the E.I. DuPont de Nemours Co. for four years as a research engineer in the fluorochemicals and fluoropolymers division. Dr. Fahmy pursued his graduate studies in Immunobiology at the Johns Hopkins University where he earned a M.S in Chemical Engineering in 1998 and a PhD in Biophysics and Biophysical Chemistry from the Johns Hopkins School of Medicine in 2002. He pursued his postgraduate work in the newly formed Dept. of Biomedical Engineering at Yale University in 2002 and joined its faculty in 2005 with a research program focusing on design and application of biomaterials for immunoregulation and immunodiagnostics.

Dr. Fahmy is the recipient of the Wallace Coulter Career award for multifunctional nanosystems for immunodiagnosis of Lupus Nephritis, and the NSF Early Career award for engineering of artificial antigen-presentation in biopolymers for cancer immunotherapy. His research interests focus on the interface of materials engineering and Immunobiology applications. Specific areas include: development of cytokine-delivery vehicles for immunotherapy, vaccine delivery, contrast agent development for non-invasive detection of immune responses in cancer and autoimmune disorders and the *ex vivo* application of nanowires for monitoring immune responses in disease and during therapy. He has over 36 publications, 2 book chapters and patents in those areas.

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