Rice University
George R. Brown School of Engineering
Department of Chemical & Biomolecular Engineering
Department of Bioengineering

Presents

Efie Kokkoli

Professor, Shell Land Grant Chair
Department of Chemical Engineering and Materials Science
University of Minnesota

Thursday, February 23, 2017 - 2:30 PM
Herzstein Hall 210

Design of ssDNA Micelles and Nanotubes for Targeting Cancer

In my group, we design peptide- or aptamer- functionalized nanoparticles for targeting cancer. In this presentation I will discuss our efforts to target a molecule called fractalkine with aptamer-amphiphiles. Fractalkine bears potential for novel therapeutics due to its unique structure and its central role as a mediator of human disease processes such as inflammatory and neoplastic disorders and neurodegenerative diseases. Currently, no therapeutics targeting fractalkine exist. We have recently developed a ssDNA aptamer that binds to fractalkine, and formed micelles out of aptamer-amphiphiles. Our work shows that we can successfully target fractalkine with our ssDNA micelles both in vitro and in vivo in a mouse model of colon cancer, thus providing opportunities to use fractalkine as a molecular target in different diseases. I will also discuss how we design ssDNA-amphiphiles that self-assemble into supramolecular nanostructures with non-spherical geometries, such as ssDNA nanotubes, and how we use these ssDNA nanotubes to target glioblastoma multiforme (GBM), the most common form of primary brain cancer, in vitro and in vivo in an orthotopic mouse model of GBM.

About the Speaker

Efie Kokkoli received her Diploma in Chemical Engineering from the Aristotle University of Thessaloniki in Greece and her Ph.D. in Chemical Engineering from the University of Illinois at Urbana-Champaign with Chip Zukoski. She completed her postdoctoral work with Matt Tirrell at the University of Minnesota, and the University of California, Santa Barbara. She is a Professor in the Department of Chemical Engineering and Materials Science (CEMS) at the University of Minnesota, and currently holds the Shell Chair. She has received the 3M Nontenured Faculty Award, the Camille Dreyfus Teacher Scholar Award, the Institute of Technology Best Professor in CEMS Award, the NSF CAREER Award, and was recently inducted into the American Institute for Medical and Biological Engineering College of Fellows. Current research interests include DNA nanotechnology, biomimetic biomaterials and biopolymers for tissue engineering and targeted drug and gene delivery.

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