Chemical & Biomolecular Seminar Series

Co-sponsored by Chemical & Biomolecular Engineering and Biomedical Engineering

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Professor

Dept. of Chemical Engineering & Materials Science

University of Minnesota

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10:00—11:00 a.m.

102 Colburn Lab

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.

Design of ssDNA Micelles and Nanotubes for Targeting Cancer

Self-assembly of biological molecules is an attractive method for engineering supramolecular biomaterials for different applications. In my group we focus on the design and characterization of amphiphilic molecules that have the tendency to self-assemble spontaneously in different structures in water. I will discuss our efforts to target a novel molecule called fractalkine with ssDNA-amphiphiles. Fractalkine bears potential for novel therapeutics due to its unique structure and its central role in certain human diseases such as inflammation and cancer. Currently, no therapeutics targeting fractalkine exist. We have recently developed an aptamer (ssDNA that has high affinity and specificity for the target of choice) that binds to fractalkine, and formed micelles out of aptamer-amphiphiles. Our work shows that we can successfully target fractalkine with our ssDNA micelles, therefore providing opportunities to use fractalkine as a molecular target in different diseases. Finally, I will discuss how we design our ssDNA-amphiphiles so that depending on the building blocks used for their design they can self-assemble into supramolecular nanostructures with non-spherical geometries, such as DNA nanotubes, and how we use the DNA nanotubes for targeting glioblastoma multiforme (GBM), the most common form of primary brain cancer.