MichiganTech

Biomedical Engineering Seminar

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"When Nano Meets Bio!"

Monday, January 25, 3:00 in room 218 EERC

Abstract

Nano-sized particles have properties that are highly beneficial for biomedical applications. Liposome and some bio-polymeric nanoparticles have been already used for drug delivery. Our group has been interested in developing metal nanoparticles for diagnosing and treating diseases. A few examples of these nano-entities are listed below.

Optical Contrast Agent for Molecular Sensing. Fluorophores have been used as a signal mediator in biosensing and imaging for a long time. Gold nanoparticles (GNP) possess high-density surface plasmon polarion fields that can be effectively used to enhance the sensitivity of bio- sensing and imaging. We have been developing a highly specific, molecular beacon-like optical contrast agent for accurate cancer detection/diagnosis utilizing the GNP's ability of fluorescence quenching and enhancement ability.

Nanoparticle Mediated Hyperthermia. An alternating electromagnetic (AEM) field at an appropriate frequency can heat nano-sized magnetic particles (MNPs) without heating surrounding tissue. When iron oxide MNPs are used for cancer treatment (hyperthermia) they can guide the heat generated by the non-invasively applied AEM field specifically to the tumor, minimizing normal tissue damage. We have studied and designed novel AEM probe configurations for more user-friendly AEM energy application to the human body.

Multi-functional Nanoparticles. Several metal nanoparticles also provide good contrast for imaging, e.g., iron oxide particles are a good MRI contrast agent and gold particles enhance the contrast of X-ray/CT. By combining these beneficial features, multi-functional nano-entities can be developed, enabling seamless disease diagnoses and treatment.

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Dr. Kyung A. Kang is a professor in the Department of Chemical Engineering at the University of Louisville. She earned a B.S. degree from Yonsei University (Food Engineering; Seoul, Korea); an M.S. from Louisiana Tech University (Biomedical Engineering); an M.E. from Cal Poly State Univ. (Mechanical Engineering); a Ph.D. from U.C. Davis (Chemical Engineering); was a Postdoctoral fellow at the University of Pennsylvania (Biochemistry and Biophysics).

Dr. Kang's research interests are: affinity purification of anticoagulants; real-time biosensors for disease diagnoses; optical mammography; nanoparticle contrast agents for molecular imaging; and nanoparticle mediated cancer hyperthermia.

Her awards include the Melvin H. Knisely Award for Young Investigator, from the International Society of Oxygen Transport to Tissue, the Most Outstanding Research Paper Published in 1997 by Biomedical Instrumentation & Technology, and a NSF CAREER Award. She has published approximately 110 scientific articles and been a University Scholar of the University Louisville since 2001.