JOHNS HOPKINS
BIOMEDICAL ENGINEERING

Monday, November 3, 1:00PM, Clark 110

Light lunch will be provided at 12:00

Putting Nanostructures to Work for Biomedical Research

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Host: Hai-Quan Mao

Abstract: Complex nanostructures with novel properties can often be prepared using very simple chemical reactions. For instance, galvanic replacement reaction between silver nanocubes and $HAuCl_4$ in an aqueous solution transforms 10-200 nm silver nanocubes into gold nanoboxes and nanocages (nanoboxes with porous walls). By controlling the molar ratio of silver to $HAuCl_4$, the plasmon peaks of resultant nanostructures can be continuously tuned from the blue (400 nm) to the near infrared (1200 nm). These hollow gold nanostructures are characterized by extraordinarily large cross-sections for optical absorption and scattering, typically on the order of $\times 10^{-15}$ m^2 and both of them are more than five orders of magnitude larger than those of conventional organic dyes. Exposure of gold nanocages to a camera flash resulted in the instant melting and conversion of gold nanocages into spherical particles due to photothermal heating. Gold nanocages can be easily bioconjugated with antibodies to target any specific cancer cells. This novel class of hollow nanostructures is being developed as contrast agents for optical imaging modalities such as optical coherence tomography (OCT) and photoacoustic tomography (PAT), as therapeutic agents for photothermal cancer treatment, and as nanoscale capsules for targeted drug delivery.

Upcoming seminars:
November 10: Dr. Michale Fee, MIT
November 21: Dr. Ron Weiss, Princeton

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