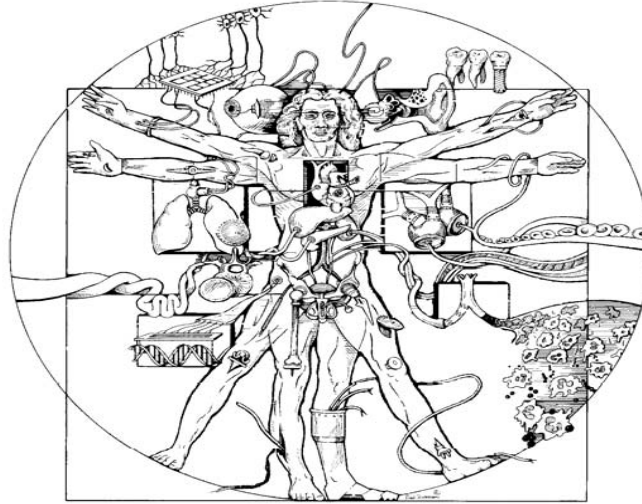


# Biomedical Engineering Seminar



**Jennifer West, Ph.D.**  
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Rice University

## “Diagnostic and Therapeutic Applications of Nanotechnology”

Abstract: The increasing capability to manipulate matter at the nanoscale is generating new materials with unique properties that promise to address unmet medical needs for future generations. As an example, metal nanoshells are a relatively new class of nanoparticles with highly tunable optical properties. Metal nanoshells consist of a dielectric core nanoparticle such as silica surrounded by an ultrathin metal shell, usually composed of gold for biomedical applications. Depending on the size and composition of each layer of the nanoshell, particles can be designed to either absorb or scatter light over much of the visible and infrared regions of the electromagnetic spectrum, including the near infrared region where penetration of light through tissue is maximal. These particles are also easily conjugated to antibodies and other biomolecules. One can envision a myriad of potential applications of such tunable particles. Several potential biomedical applications are under development, including immunoassays, modulated drug delivery, photothermal cancer therapy, and imaging contrast agents. For example, in photothermal cancer therapy, nanoshells can be injected intravenously, accumulate at tumor sites due to the EPR effect and/or molecular targeting, then generate heat upon illumination with near infrared light, leading to destruction of the tumor. This has shown very promising results in a mouse colon carcinoma model, with 100% survival of nanoshell treated mice at 1 year. These materials are now in phase I human clinical trials. Furthermore, integrated imaging and therapy applications have been accomplished with nanoshells designed to provide both absorption and scattering, potentially enabling “see-and-treat” approaches to cancer therapy.

**Monday, March 2, 2009**

**1:00 pm**

**Keating 103**

Host: Jennifer Barton, Ph.D. (621-4116)

*Persons with a disability may request a reasonable accommodation by contacting the Disability Resource Center at 621-3268 (VTTY). Requests should be made as early as possible to allow time to arrange the accommodation*