

Abstract for an Invited Paper
for the NEF10 Meeting of
The American Physical Society

Optically-directed Nanobiomedicine: merging nanotechnology with light for improved diagnostics and new therapeutics

NAOMI HALAS, Rice University

Just beyond the wavelengths of visible light, the near infrared region of the optical spectrum provides a window into the human body. In this region of the spectrum, known as the “water window”, light penetrates several inches into body, making virtually all soft tissue of the body optically accessible. This has opened up the possibility of developing optical addressable diagnostic methods, devices, even therapies that are essentially noninvasive. An example of this is Optical Coherence Tomography, an emerging technology useful for near infrared imaging of tumors. Our work over the past several years has involved the development of nanoshells, a plasmonic nanoparticle we designed that selectively absorbs or scatters light in this special wavelength region. We have developed a suite of applications for plasmonic nanoparticles to address challenges in human health that include drug and gene delivery, enhancing the resolution of bioimaging modalities, and a novel, nanoengineered cancer therapy, currently in clinical trials. In my talk I will describe the physical principles behind these applications, and why this approach may expand our vision for combating disease and improving human health.