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Controlled agglomeration of plasmonic gold nanoparticles enhances sensitivity of optoacoustic assays

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Gold nanoparticles of various shapes are promising tools for biomedical applications. One type of gold nanoparticle with a strong tunable plasmon resonance in the near-infrared spectral range is the gold nanorod (GNR). Unique properties of gold nanorods (GNR) such as high longitudinal surface plasmon resonance (LSPR) absorption, different absorption wavelengths, and low level of light scattering, favor these nanoparticles as ideal contrast agents for optoacoustic imaging.

Optical properties and optoacoustic imaging suggest that novel methods can be developed to determine protein concentration and aggregation. Such methods are based on changes in LSPR of GNR conjugates during association with analytes. GNR conjugates with specific and non-specific antibodies, as well as PEGylated GNR used as control, were incubated with solutions of specific protein or PBS as control. The properties of the conjugates were monitored through light absorption, zeta-potential and size distribution. Experimental results showed dramatic agglomeration for antibody GNR and their antigen but not for nonspecific binding and control samples. This effect could also be quantified by a LSPR shift of specifies conjugate and was used for optoacoustic assay calibration and measurement. Investigation of new methodologies to examine protein-protein interactions and protein-complex binding partners are essential to the understanding of the biological function and activity of the proteins, and the detection of different analytes into non-optically-transparent media with high light scattering.

Biography

Boris Ermolinsky completed his Ph.D. at the Engelhardt Institute of Molecular Biology, Russian Academy of Science, Moscow, Russia and carried out postdoctoral studies at University of Texas Health Science Center, School of Public Health. He is currently Assistant Professor at the Department of Biomedicine, University of Texas Brownsville. He has co-authored well over 30 papers in peer review journals. His research program is focused on the understanding of intermolecular interactions, modifications and characterization biomolecules and nanoparticles by different analytical methods.

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