

Glyco-Conjugated Gold Nanorods Based Biosensor for Optical Detection and Photothermal Ablation of Food Borne Bacteria

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Abstract : Food borne bacterial species have been identified as major pathogens in most of the severe pathogen-related diseases among humans which result in great loss to human health and food industry. Conventional methods like plating and enzyme-linked immune sorbent assay (ELISA) are time-consuming, laborious and require specialized instruments. Nanotechnology has emerged as a great field in case of rapid detection of pathogens in recent years. The AuNRs material has good electro-optical properties due to its larger light absorption band and scattering in surface plasmon resonance wavelength regions. By exploiting the sugar-based adhesion properties of microorganism, we can use the glycoconjugates capped gold nanorods as a potential nanobiosensor to detect the foodborne pathogen. In the present study, polyethylene glycol (PEG) coated gold nanorods (AuNRs) were prepared and functionalized with different types of carbohydrates and further characterized by UV-Visible spectrophotometry, dynamic light scattering (DLS), transmission electron microscopy (TEM). The reactivity of above said nano-biosensor was probed by lectin binding assay and also by different strains of foodborne bacteria by using spectrophotometric and microscopic techniques. Due to the specific interaction of probe with foodborne bacteria (Escherichia coli, Pseudomonas aeruginosa), our nanoprobe has shown significant and selective ablation of targeted bacteria. Our findings suggest that our nanoprobe can be an ideal candidate for selective optical detection of food pathogens and can reduce loss to the food industry.

Keywords : glyco-conjugates, gold nanorods, nanobiosensor, nanoprobe

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