Carboxylate Terminated Gold Nanoparticle for Immobilization of Hexa-arginine tagged esterase

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Composite materials of metal nanoparticle with biomolecules are assumed to have potential applications in genomics, proteomics, biomedicine and biosensors. The immobilization protocols onto nanoparticles encompass direct adsorption of biomolecules, covalent bonding through chemical reaction, and specific affinity tags with thiol chemistry. In this work, we investigate a carboxylate terminated gold nanoparticle for specific immobilization of hexa-arginine tag recombinant protein. 16-mercapto-hexadecanoic acid (MHA) protected Gold nanoparticle (AuNP-COOH) shows high stability in various aqueous solutions for long term without aggregation and capability to capture recombinant proteins with poly-arginine tag specifically. All other proteins present in cell lysate solution as well as the 6Arg-tagged esterase were also adsorbed onto the AuNP-COOH without agglomerate formation, which is presumably driven by nonspecific interaction. The amountof esterase on AuNP-COOH was five times as large as the nonspecifically adsorbed counterpart, indication strong and fast binding between poly-arginine tag and carboxylate of AuNP-COOH. Esterase immobilized on AuNP-COOH shows typical enzymatic activity and sustained its activity upon long term storage by monitoring the absorption spectrum of an enzyme substrate, *p*-nitrophenol butyrate (pNPB).