

Nanochemistry and biotechnology

Determination of the surface coverage of gold nanoparticles with antioxidant enzyme – catalase based on electrophoretic method

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The use of nanomaterials as carriers of biomolecules, such as proteins and enzymes, requires their immobilization on the surface of the nanomaterial. Gold nanoparticles (AuNPs) serve as excellent candidates for protein bioconjugation, because they readily react with the amino and thiol groups of proteins. Application of such structures in in vivo research requires a broad characteristic related to the degree of surface coverage of nanoparticles with studied proteins. For this purpose gel electrophoresis may be successfully applied to monitor the concentration of the unbound protein at various stages of its attachment and quantitative measurements of surface coverage of nanoparticles with protein [1].

Research was focused on the selection of conditions for polyacrylamide gel electrophoresis (PAGE) of gold nanoparticles modified with antioxidant enzyme – catalase (CAT). Electrophoresis was performed under different conditions (native, with and without SDS, and with and without 2-mercaptoethanol) to find the optimal conditions for determining the surface coverage of AuNPs with CAT. Native-PAGE was selected as the best method for determination of the surface coverage of gold nanoparticles with catalase which was about 16 CAT / 1 AuNP with 13 nm of diameter.

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1. *Ranoszek-Soliwoda K., Czechowska E., Tomaszewska E., Celichowski G Kowalczyk T., Sakowicz T., Szemraj J., Grobelny J. Catalase-Modified Gold Nanoparticles: Determination of the Degree of Protein Adsorption by Gel Electrophoresis // Colloids and Surface B: -2017 - accepted*