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Glycoprotein adsorption studies onto fibrous polymer grafted and concanavalin A immobilized magnetic silica particles

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In this study, preparation of fibrous polymer grafted and Concanavalin A immobilized magnetic silica nano-particles (Fe_3O_4@SiO_2@Polym@ConA) and its utilization in the affinity chromatography area for separation of glycoproteins were realized. In the first step, the magnetic nanoparticles were synthesized by thermal co-precipitation reaction [1], then they coated with a silica layer by the hydrolysis and condensation of tetraethyl orthosilicate (TEOS). In the second step, the nanoparticles were grafted with polydopamine (PDP) in a weak alkaline solution, then, an atom transfer radical initiator (ATRP; i.e., bromoacetyl bromide) was covalently attached. In the third step, polyglycidyl methacrylate p(GMA) was grafted via surface initiated-ATRP reaction, finally Conconavalin A was immobilized via epoxy ring opening reaction on the grafted p(GMA) nano-fibril, it has an affinity for D-glucose, D-mannose and sterically related residues of glycoproteins [2]. Such nanoparticles can be used as an affinity matrix for separation of glycoproteins from complex biological liquids because of the affinity ligand Con A specific to carbohydrate residue of the glycoproteins. Glucose oxidase (GOD), invertase (INV), and α-amylase (AMY) were selected as model glycoproteins whereas lipase was used as a control protein in the adsorption/desorption studies in batch systems. The maximum adsorption for tested model glycoproteins and lipase was at pH 6.0 and 7.0 respectively. The adsorption capacity of the Fe_3O_4@SiO_2@Polym@ConA nano-particles increased with increase in initial concentration of the tested all proteins. The maximum adsorption capacity of GOD, INV, AMY and lipase on the Fe_3O_4@SiO_2@Polym@ConA nano-particles was found to be 39.9, 50.6, 37.4 and 5.3 mg/g, respectively. Moreover, the desorption ratio of all the tested proteins was found to be more than 94% that implied Fe_3O_4@SiO_2@Polym@ConA nano-particles could separate proteins by adsorption–desorption process.

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2. *Bayramoglu G., Doz T., Ozalp V.V., Arica M.Y.,* Stability of invertase on silanized magnetic nanoparticles // Food Chem. -2017 **-221**, -P. 1442-1450.