

Preparation of Fe₃O₄@Nickel-Silicate Core-Shell Nanoparticles for Immobilization of His-Tagged Enzymes

신무광, 강병훈, 기지선, 한승민, 김명훈, 윤남경¹, 안정오¹, 함승주[†]

연세대학교; ¹생명공학연구원

(haam@yonsei.ac.kr[†])

Enzyme immobilization technique provides adequate means to not only efficient use of proteins but also easy-remove of product contamination. Immobilization of enzyme on inorganic nanoparticles have been widely investigated due to the benefits of large surface area and high stability in various temperature. However, currently applicable method to synthesize transition metal ions on a surface of nanoparticles requires complicated steps. Herein, we synthesized spiky shaped Fe₃O₄@nickel-silicate core-shell nanoparticles via facile synthetic route. Nickel ion surfaced nanoparticles exhibited high immobilization capacity (80ug/mg) of His-TEV protease, bound based on His-tag and transition metal ion affinity. To investigate enzymatic activity of immobilized TEV protease, we analyzed cleaved quantity of MBP-IgG protein, which have TEV protease-specific cleavage site. Finally, these enzyme immobilized nano-complex were separated from reactant and reused by application of external magnetic field. Consequently, our newly developed nickel doped nanoparticles would provide several advantageous features in nanoparticle-based enzyme immobilization techniques.