Enzyme-magnetic nanoparticle conjugates as rigid biocatalyst for the elimination of aromatic hydrocarbon

의수연, 이선영, 이진형, 장정호*
한국세라믹기술원
(jhchang@kicet.re.kr*)

Enzymes catalyze chemical reactions with impressive levels of stereospecificity. Under the most benign conditions, enzymes can consistently maintain their catalytic activity. Unfortunately, aromatic hydrocarbons which have detrimental biological effects tend to frustrate enzymatic catalyzation due to their high hydrophobicity which to lead conformational changes of enzyme stereostructures. This study have reported the design of enzyme-magnetic nanoparticle conjugates as a biocatalyst which are capable of catalyzing the ring-cleavage of a toxic aromatic hydrocarbon. Ni^{2+} functionalized silica-coated MNPs are simply synthesized as to a supporting material of biocatalyst through covalent interaction with the his-tagged CatA. The CatA@Ni-MNPs process catalyzing catechol as retention of high activity. Moreover, the catalytic property of the conjugates is more stable at high concentrations of catechol than its free counterpart. It means that the biocatalyst system would be possible to rigidification of the enzyme structure as wall as site-specific conjugation of enzymes to the surface ofl Ni-MNPs. This work was supported by a grant from the Fundament R&D Program for Core Technology fo Materials funded by Ministry of Knowledge Economy, ROK.