

## Preparation of hydrogel microparticles entrapping enzyme immobilized magnetic nanoparticles

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Magnetic particles are widely studied for their applications in various fields, such as biology, medicine for enzyme and protein immobilization, owing to its biocompatibility, facility of modification, and high loading capacity. However, enzymes are very sensitive to their environment that little difference in humidity, thermal condition, and pH can result in denaturation and loss of their natural functions. One way to overcome such fastidious nature of enzymes is to use hydrophilic hydrogel microparticles to maintain the apt humidity with enzyme immobilized magnetic nanoparticles (MNP) for increase of enzyme density. In this study, we fabricated hydrogel microparticles entrapping enzyme-immobilized MNP. First, the MNPs were treated with amino functionalized silane (APTES) and glutaraldehyde to immobilize HRP enzymes covalently. After we confirmed that enzyme was immobilized onto MNP by using FTIR and XPS analysis, the HRP-immobilized MNP containing PEG hydrogel microparticles were prepared by UV-initiated free radical polymerization combined with photolithography. The validity of enzyme reaction within hydrogel microparticles were verified with Amplex Red and various concentrations of H<sub>2</sub>O<sub>2</sub>.