

Polymer hydrogel microparticles containing enzyme-QD conjugates for optical biosensor applications

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For the on-site analysis of phenol, PHEMA hydrogel microparticles containing conjugates of enzyme and fluorophore as an optical biosensor were prepared and these particles were immobilized in the microfluidic channels fabricated with PDMS. The tyrosinase-QD conjugates were successfully encapsulated in the PHEMA particles via the dispersion photopolymerization and they did not lose their activities after they went through the polymerization. The emission intensity of PHEMA microparticles containing tyrosinase-QD conjugates decreased when the phenol concentration increased due to the fluorescence quenching effect of quinone intermediates produced by the enzyme reaction between tyrosinase and phenol. After the PHEMA particles containing tyrosinase-QD conjugates were immobilized in the microchannel, the emission intensity of the particles decreased as phenol was introduced in the microchannel. The results indicate that the microchannels using PHEMA hydrogel microparticles containing tyrosinase-QD conjugates have a possibility to be used as analytical microdevices to detect phenol.