Evaluation of Whole Lysosomal Enzymes Directly Immobilized on Titanium (IV) Dioxide to Develop Antimicrobial Agents

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Direct immobilization of lysosomal enzymes isolated from egg white on TiO_2 nanoparticles, using the shaking methods was described in this study. To immobilize the lysosomal enzymes, we used two different types of TiO_2 particles, i.e. rutile and anatage, and 0.1 M phosphate buffer (pH 6.0) as a solvent. Through shaking method (150 rpm, room temp., 10 mins) optimized in this study, the immobilization efficiency, activity and stability of lysosomal enzymes immobilized on TiO_2 nanoparticles were evaluated. Among various volume ratio (w/w) of lysosomal enzymes and TiO_2 nanoparticles, we found that 100 % of immobilization efficiency of was observed at a ratio of 1:20 (enzyme:TiO_2 w/w). Furthermore, the antimicrobial activities of the immobilized lysosomal enzymes were confirmed using viable cell counting methods against *E. coli*. Our results showed that antimicrobial activity of immobilized lysosomal enzymes is stable and can be maintained up to 2 weeks. Finally, we suggest that activity and stability of immobilized lysosomal enzymes will be maintained for a long time, comparing with free lysosomal enzymes.