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Gold nanoparticle stabilized with tyrosine-rich biomolecules and their catalysis applications

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The natural enzyme, especially biocatalyst, shows high catalytic efficiency and substrate specificity on catalyst reactions. However, the natural enzyme has some problems such as pH, temperature, or kinds of solvents. These disadvantages of the natural enzyme have motivated researchers to develop an artificial enzyme like enzyme-mimetic nanoparticles using novel metal nanoparticles to promote the enzymatic reactions, for example, peroxidase, reductase, oxidase, etc. Here, we explain the gold nanocrystals stabilized with tyrosine-rich biomolecules, especially peptide (YC₇@Au), because peptide can be self-assembled with various shapes and shows good characteristic about stability, conductivity, and easy to fabrication, etc. To form various types of YC₇@Au nanostructures, we changed the peptide and gold ion concentrations. Also, the morphologies and optical properties of YC₇@Au were characterized by TEM, UV/Vis, XRD, FT-IR, etc. Finally, we evaluated and optimized catalytic reaction efficiency of YC₇@Au to calculate their reaction rate (k) and activation energy (E_a) using the p-nitrophenol reduction mechanism. We believe that gold nanoparticles stabilized with tyrosine-rich peptide can be used for various catalytic reactions as the unique enzyme-mimetic nanostructures.

Biography

Namhun Lee has completed his MS and now pursuing PhD at the Kangwon National University of Chemical Engineering. His studies are focused on biomaterials and fabrication of nanostructure using peptide. Also, he is studying biosensor platforms for detecting biomarkers.

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