

Gold Nanocrystals Stabilized with TRP Peptide for Highly Efficient Reducing Nanocatalysts

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The enzyme as biocatalyst shows high catalytic efficiency and substrate specificity. However, the enzyme has a lot influenced by environmental conditions, for example, pH, temperature, or kinds of solvents. These disadvantages of the enzyme have motivated researchers to develop an artificial enzyme like enzyme-mimetic nanoparticles using novel metal nanoparticles to promote the enzymatic reactions, including peroxidase, reductase, oxidase, etc..

Here, we report the gold nanocrystals stabilized with tyrosine-rich peptide (TRP) for highly efficient reducing nanocatalysts ($\text{PEP}_{\text{Shell-Au}}$) and optimized their nanocatalytic activity for the *p*-nitrophenol reduction. We changed the TRP peptide and gold ion concentrations to synthesize various shapes of nanocatalyst. The structure and optical properties of $\text{PEP}_{\text{Shell-Au}}$ were characterized by TEM, UV/Vis, XRD, FT-IR, etc.. Finally, we evaluated nanocatalytic activity of $\text{PEP}_{\text{Shell-Au}}$ for the effective reduction of the *p*-nitrophenol and calculated their reaction rate (k) and activation energy (E_a). We believe that gold nanocrystals stabilized with TRP peptide can be used for the various catalytic reactions as the unique enzyme-mimetic nanostructures.