

Enzyme Inhibition by Inorganic Nanoparticles of Different Shapes

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To the best of our knowledge, the systematic study about the direct effect for the shapes of inorganic nanoparticles on the structure and activity of enzyme has never been established before. On the basis of these considerations, herein, we carried out an investigation on the activity change in HRP upon the addition of different shaped ZnO nanomaterials.

The relative activity of HRP decreases with the increasing the concentrations of ZnO nanopyramids (nPY) and nanoplates (nPL) while the enzyme activity is found to be approximately invariant for all concentrations of spherical ZnO nanoparticles (nPA). In any concentrations of ZnO nanomaterials, ZnO nPY show much higher inhibition effect on HRP than that mediated by ZnO nPL. For example, with 1.25 μM concentration of ZnO nPY, the activity of HRP was reduced by $\sim 75\%$ of the original HRP activity, whereas the similar concentration of ZnO nPL leads to only $\sim 21\%$ enzyme activity lost. When the concentration of ZnO nPY increased to $\sim 3.0\ \mu\text{M}$, the activity of HRP was almost lost. However, in the case of ZnO nPL, the HRP still had about 30 % of enzyme activity.