Chang Liu et al., J Adv Chem Eng 2018, Volume: 08
DOI: 10.4172/2090-4568-C1-005

5th World Congress on
Chemical Engineering and Catalysis
August 28-29, 2018 | Paris, France

Novel magnetic multi-metallic nanocages as highly active enzyme-mimetic catalysts

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Ingenious design and fabrication of metal nanomaterials have become versatile tools for the advancement of nano-catalysis technique. Polyhedral noble metal nanocages have gained great attention due to their porous walls, hollow interiors, high porosity, and potential applications in diverse areas such as electrocatalyst, bio-microcapsule, and photothermal materials etc. Based on this, we designed a novel co-reduction approach to obtain a series of octahedral alloy nanocages by employing Cu2O as template and copper source. Various noble metals and magnetic metals could be introduced discretionarily to obtain different multi-metallic nanocages. Among them, typically, the structure and peroxidase-like activity were investigated systematically by using Ni-introduced CuAu nanocages as the prototype, and relevant parameters of enzymatic activity were also tested. Compared with mono-metallic nano-octahedrons, alloy nanocages have superior catalytic activity, and such magnetic catalyst could still keep relatively high catalytic efficiency after several cycles. Moreover, the optimal pH and reaction temperature in this peroxidase mimetic system are very similar to the optimal active condition of natural horseradish peroxidase (HRP). The high specific surface area of cage-like nanostructure provides more active sites, and the extra magnetism (recyclability) and low cost endow them potential commercial value. It is anticipated that these multi-metallic nanocages have practical application value in the field of organic catalysis and enzymatic reactions.

Biography

Chang Liu has received his BS and MS degrees from Anhui Normal University (China) in 2012 and 2015, respectively. He is currently pursuing his PhD in Southest University, China. His current scientific interests are focused on developing novel nanomaterials for bio-sensors and catalytic application. He has published five papers in reputed journals as first author.

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