

SESSION I: SPEAKER ABSTRACTS

Single-Chain Metal-Organic Nanoparticle catalyst for CuAAC Reaction

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Many enzymes achieve their excellent catalytic behavior through the precise folding of polypeptide scaffolds, often with one or multiple catalytic metal centers. Developing synthetic catalysts that is highly efficient and potentially perform biorthogonal reactions in complex biological related environments is attracting increasing attention in recent years. Our group developed copper-crosslinked single organic nanoparticles (Cu-MONPs) which served as highly efficient catalysts for CuAAC click reactions both preparatively and as an intracellular catalyst. A number of different Cu-MONPs were synthesized and tested with several series of substrates, and the structure-activity relationship of both Cu-MONPs catalysts and substrates was established. In kinetics studies, the Cu-MONPs showed behavior that fit the Michaelis-Menten equation as well as two substrates enzyme kinetics equations, suggesting the catalysis goes through a binding process which is similar to that used by enzymes. Finally, a new type of Cu-MONPs were designed and synthesized, and shows significantly faster kinetics, indeed faster than the most efficient small molecules catalyst known (BTAA).

