# Facile Access to Amides from Oxygenated or Unsaturated Organic Compounds by Metal Oxides Nanocatalysts Derived from Single-source Molecular Precursors

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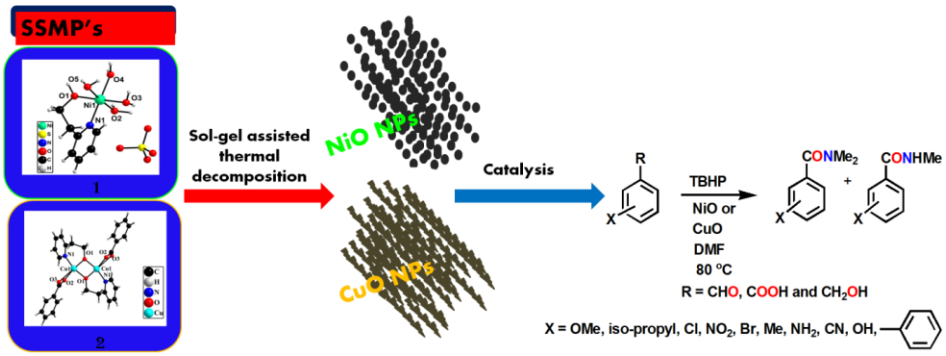
## Abstract

Oxidative amidation is a valuable process for the transformation of oxygenated organic compounds to valuable amides. However, the reaction is severely limited by the use of an expensive catalyst and limited substrate scope. To circumvent these limitations designing transition metal based nanocatalyst via more straight forward and economical methodology with superior catalytic performances with the broad substrate scope is desirable. To resolve aforementioned issues we report a facile method for synthesis of nanocatalysts NiO and CuO by sol-gel assisted thermal decomposition of complexes $[Ni(hep\text{-}H)(H_2O)_4]SO_4$, (SSMP-1) and [Cu(μ-hep)(BA)]2, (SSMP-2) [hep-H = 2-(2-hydroxylethyl)pyridine; BA = benzoic acid] as single-source molecular precursors (SSMPs) for oxidative amidation of benzyl alcohol, benzaldehyde and benzoic acid by using N, N-dimethylformamide (DMF) as solvent and as an amine source, in the presence of tert-butylhydroperoxide (TBHP) as oxidant, at T=80 °C. In addition to nanocatalysts NiO and CuO, our previously reported Co/CoO nanocatalyst (CoNC), derived from complex $[CoII(hep\text{-}H)(H_2O)_4]SO_4$ (A) as an SSMP was also explored for aforesaid reaction. Also, we have carefully investigated the difference in the catalytic performance of Co, Ni and Cu-based nanoparticles synthesized from the single source molecular precursor (SSMP) for the conversion of various oxygenated and unsaturated organic compounds to their respective amides. Amongst all, CuO showed optimum catalytic performance for the oxidative amidation of

various oxygenated and unsaturated organic compounds with a broad reaction scope. Finally, CuO can be recovered unaltered and reused for several (6 times) recycles without any loss in catalytic activity.




## References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