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Title:	MORPHOLOGY ENGINEERING AND CATALYTIC STUDIES OF CuO NANOPARTICLES DERIVED FROM COORDINATION POLYMERS
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Abstract:	<p>The new scientific technologies are the result of human dreams and imagination. The emergence of nanotechnology, a 21st-century frontier, is the outcome of such dreams. Nanotechnology and nanomaterials have become an integral part of human life by providing society with greater benefits. Henceforth, researches on synthesizing and processing diverse range of nanomaterials with unique physical and chemical properties has got significant attention. Metal-Organic Frameworks (MOFs) or Coordination Polymers (CPs) are an important class of compounds because of their various potential applications such as gas storage, separation, catalysis, and sensing. Such porous materials have attracted enormous attention because of their high surface areas, controllable structures, and tunable pore sizes. MOF-based metal oxide nanoparticle synthesis has gained enormous importance due to its less dependence on surfactants or modulators. The hierarchical transfer of morphology and other characteristics from framework to the porous metal oxides makes this approach a unique and more efficient than other existing methodologies. With these aspects in mind and the quest for some beautiful and fascinating nanomaterials, in this work a strategy of using CPs as the precursors for the formation of metal oxide nanoparticles is developed. In particular, the synthesis of copper oxide (CuO) nanoparticles from CPs using direct calcination method under ambient conditions. These precursor CPs were synthesized at room temperature using metal salts and ligand in a one-pot self-assembly process and characterized using SCXRD, PXRD, TGA, UV-vis and FTIR spectroscopy. These CPs were calcined at various optimized reaction conditions to form CuO nanoparticles and characterized using PXRD, FTIR, SEM, TEM and HRTEM. The effect of temperature and time on the morphology of CuO has been demonstrated. Due to the Lewis acidic nature of porous CuO nanoparticles, these have been used as heterogeneous catalysts for C-N bond-forming Strecker reaction for the formation of <math>\alpha</math>-aminonitriles under solvent-free conditions. We have found that these porous CuO nanoparticles act as an efficient catalyst with less loading and less reaction time. A broad substrate scope has also been demonstrated showing the versatile nature of CuO nanoparticles as heterogeneous catalysts. Also, the recyclability and stability after more than three cycles further make it a promising candidate in the field for heterogeneous catalysis.</p>
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