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HETEROATOM RICH MESOPOROUS CARBON SUPPORTED GOLD NANOPARTICLES – AN EFFICIENT CATALYST FOR BENZYL ALCOHOL OXIDATION

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ABSTRACT

Hierarchically porous carbons containing oxygen (NC/O) and, oxygen and nitrogen (NC/O,N) were synthesized by nanocasting using furfuryl alcohol and furfuryl amine as the carbon precursors and hierarchically porous silica (SiO_2) monoliths as the template. Gold nanoparticles (Au NPs) supported on the nanocast carbons were synthesized by solution infiltration followed by reduction by heating in a hydrogen atmosphere. The materials were characterized by transmission electron microscope (TEM), scanning electron microscope (SEM), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), Raman spectroscopy and N_2 adsorption for textural parameters determination. The mesoporous and macroporous structures of the SiO_2 template were well replicated in the nanocast carbons giving high surface area and mesopore volume. Au NPs were well dispersed on the carbon support and were in zero oxidation state. Amorphous carbon was present in all samples and a new type of disorder could be seen in NC/O,N consistent with the presence of nitrogen. Catalytic oxidation of benzyl alcohol by hydrogen peroxide showed that Au NPs on both NC/O and NC/O,N were catalytically active, with the NC/O,N supported Au NPs being more active and showing less decrease in activity with reuse.

KEYWORDS: *Heterogeneous, Nitrogen, Porous, Au NPs, Benzyl alcohol, Catalysis*