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Ionic Liquid Green Synthesis of CeO_2 Nanorods and Nano-Cubes: Investigation of the Shape Dependent on Catalytic Performance

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Abstract

A new facile and scalable approach for utilizing basic ionic liquid, 1-butyl-3-methylimidazolium hydroxide ([BMIM]+OH−) for the fabrication of different shapes of ceria nanostructures was adopted. The features of the fabricated ceria and their corresponding gold nanocatalysts were characterized by employing ICP, HRTEM, XRD, XPS, BET and UV–vis spectroscopy. Catalytic performance of CeO2 and its dependence on shape was studied in the oxidation of CO and olefins epoxidation. The ratio between the ionic liquid and cerium precursor is one of the valuable factors used to monitor the growth of the particles. The catalytic performance of ceria was found to be dependent on the morphology of the catalysts. The catalytic performance of CeO2 in the form of nanorod shapes is better than that of nanocubes and bulk. The deposition of gold nanoparticles on different shaped CeO2 much enhanced their catalytic performance. This enhancement in catalytic performance was, however, more significant in the case of rod-shaped ceria.

Biography:

Mosaed Alhumaimess is Associate professor at Jouf University, SA. He started his research on Physical chemistry at King Saud University, SA. During his Ph.D. he joined research groups at Cardiff University, United Kingdom. He obtained Ph.D on 2012, and started his academic carrier as assistant professor at Jouf University, and promoted to Associate professor on 2019. Dr. Mosaed has successfully published several papers related to the area of designing new nanomaterials for catalysis applications.

Speaker Publications:

1. "Gold Nanoparticles Supported on Carbon Derived from Solid Olive Waste for Epoxidation of Cyclooctene"; Asian J. Chem. / 2018 / 30(8) /pp 1731-1735
2. "Adsorption, kinetic and thermodynamic studies of safranin and methylene blue on a novel adsorbent based on phosphorylated sawdust"; Desalination and Water Treatment/ Vol 151 (2019) 199–211
3. "Green synthesis of spongy Nano-ZnO productive of hydroxyl radicals for unconventional solar-driven photocatalytic remediation of antibiotic enriched wastewater"; Journal of Environmental Management/ Vol 271, 2020, 110961.
4. "Sulfhydryl functionalized activated carbon for Pb(II) ions removal: kinetics, isotherms, and mechanism"; Journal of Separation Science and Technology/ Vol 55, 2020- Issue 7
5. "Recyclable glutaraldehyde cross-linked polymeric tannin to sequester hexavalent uranium from aqueous solution"; Journal of Molecular Liquids/ Vol 281, 2019, Pages 29-38.

6th International Conference on Physical and Theoretical Chemistry; Webinar- March 18-19, 2020.

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