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## A review on ecofriendly syntheses of mesoporous silica from biomass and fly-ash

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Mesoporous silica materials have always represented an exceptional dominance in the field of material synthesis owing to the exploitation of their superior surface properties. Consequently, they have earned wider applicability in various fields ranging from catalysis, adsorption, sensors, nano-casting, chromatography and medicine. Different approaches have been developed to synthesize mesostructured silica materials using chemical sources like silicon alkoxide (silicon tetraethoxysilane) as the typical silicon source and expensive structure directing agents. However, in response to the growing environment concern, sustainability issues associated with the silica precursors, harsh synthetic conditions and high cost of its production limit their manufacture is at industrial scale. Moreover, the structuring agents (surfactants) used in the synthesis process, being non-biodegradable are generally lost during the last step of mesoporous silica synthesis. So, there has been an emergent need to develop more environment-friendly and sustainable procedures for synthesizing mesoporous silica nanostructures. Keeping in view the credentials of green chemistry, nowadays Ordered Mesoporous Silica (OMS) materials have been synthesized from the biomass comprising the agricultural wastes like rice straw, corn cob and bagasse and industrial wastes like coal fly ash used as the silica source and surfactants derived from renewable sources. It not only makes the entire synthesis process cost-effective which is the emergent need of material synthesis but caters to deal with the problem of waste disposal associated with the coal power plants. Since the synthesized silica materials are expected to be efficient adsorbents so they can be effectively utilized for the treatment of waste water discharged into the environment as industrial waste that contains toxic organic and inorganic chemicals and causes serious soil and water pollution. In this regard, a comprehensive review based on recent advances on the greener and sustainable synthesis of mesoporous silica nanostructures and employing their use for various industrial applications will be presented.

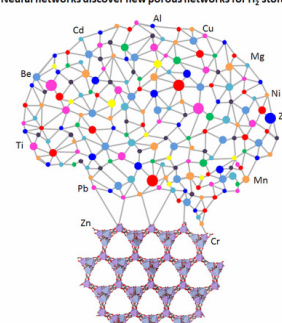
Neural networks discover new porous networks for H<sub>2</sub> storage

Figure-1: Ecofriendly synthesis.

## Recent Publications

1. Sareen S, Mutreja V, Pal B and Singh S (2017) Synthesis of bimetallic Au-Ag alloyed mesocomposites and their catalytic activity for the reduction of nitroaromatics. *Applied Surface Science*; 435: 552-562.
2. Sareen S, Mutreja V, Singh S and Pal B (2016) Fine CuO anisotropic nanoparticles supported on mesoporous SBA-15 for selective hydrogenation of nitroaromatics. *Journal of Colloid and Interface Science*; 461: 203- 210.

## Biography

Shweta Sareen has her expertise in the designing and synthesis of mesoporous silica-based nanomaterials. She has developed a strong knowledge in the fabrication of morphologically and dimensionally controlled anisotropic metal nanoparticles viz., nanorods, nanowires and nanotubes of coinage metals and investigation of the relation between their various physicochemical and catalytic properties. She has a good exposure of various characterization and analytical techniques. Presently, she is working as a Post Doc Fellow under the National Post Doc Fellowship Scheme awarded by the Science and Engineering Research Board.

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