

Colloquium Notice

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Carbide Derived Carbon

Large surface area and adjustable internal surface chemistry of porous carbons are attractive for a wide range of applications, including electrical energy storage, catalyst support, gas separation membranes, hydrogen storage media, adsorption and separation of biomolecules. Major efforts have been directed towards control of carbon structure, pore size, shape and uniformity, specific surface area (SSA) and total pore volume of these materials.

Carbide derived carbons (CDC), produced by selective etching of metals from metal carbides, have up to 80% open pore volume and finely tunable pore size and SSA. This is achieved by "burning out" the metals (and metalloids) in halogen atmospheres at modest temperatures. The resulting carbon retains the original shape of the carbide and shows linear reaction kinetics, allowing conversion of a carbide surface to a carbon layer of any thickness, including the entire monolith, film or particle. Depending on the synthesis conditions, the process allows formation of nanotubes, onions, nanocrystalline diamonds, and nanoporous carbons with a remarkably narrow pore size distribution. The ability of the developed technology to fine tune the pore size, and independently control the microstructure and surface termination in carbon, offers unique opportunities for fundamental studies of adsorption and transport in porous media.

This presentation will provide an overview of the state of the art in the CDC synthesis and describe major breakthroughs in energy and biomedical applications, such as hydrogen storage, electrical energy storage, and adsorption of proteins achieved by rational design of carbon materials.

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