

CARBON NANOFIBERS FOR HYDROGEN STORAGE

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The main obstacle to the use of hydrogen as a transportation fuel is the lack of a suitable means of storage and production. Hydrogen compressed gas storage is bulky and requires the use of high strength containers. Liquid storage of hydrogen requires cryogenic temperatures and efficient insulation. Solid state storage offers the advantage of safer and more efficient handling of hydrogen, but promises at most 7% hydrogen by weight and more typically 2%. Therefore, there has been much interest in recent reports of certain carbon nanofibers (CNFs). CNFs were synthesized and their hydrogen desorption and adsorption properties are reported for 77 and 300 K. Catalysts were made by several different methods including urea decomposition, co-precipitation and bio-reduction. The nanofibers were grown by chemical vapour deposition of natural oils or plant fibers over the catalysts at 950 °C. Hydrogen adsorption and desorption were measured using a volumetric analysis Sieverts' apparatus. The carbon nanofibers were characterized by SEM, TEM, Raman, XRD and Brunauer–Emmett–Teller surface area analysis. The effect of synthesis parameters like catalyst, carrier gas, temperature and precursor to obtain suitable CNFs which give maximum hydrogen adsorption were studied. The absolute level of hydrogen adsorption measured using these materials was found to 3-4 wt%, which is greater than other forms of carbon.

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