



Hydrogen storage on nanostructured carbon materials by adsorption and compression

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Nanostructured carbon materials have received a noteworthy attention as gas storage materials due to their high surface area ensuring, at the same time, a completely reversible gas uptake and release. Hydrogen is stored on carbon surface through physisorption. Therefore, high hydrogen adsorption is obtained in solids exhibiting high surface areas and narrow pore size distribution in the nanometre range (< 2 nm). Several carbon adsorbents have been investigated, among them activated carbons (ACs), carbon nanotubes (CNTs), carbon nanofibers (CNFs), templated carbons (TCs) and MOF-derived carbons. Absolute hydrogen adsorption capacities up to 7 wt.% were achieved at 77 K [1], whereas a hydrogen uptake of 1 wt.% was achieved in average by all the carbon materials investigated [2–5].

Nanostructured carbons, like activated carbons, can be used to develop an innovative non-mechanical system to compress hydrogen. A thermally-driven compression, in addition to absence of moving parts, no vibration, no noise and simple design, are the main advantages of such a system. Pressures as high as 70 MPa can be reached at cryogenic temperatures, allowing the innovative system to be used to compress hydrogen in decentralized facilities of small and average size. I will present (i) the most relevant studies related to hydrogen storage on carbon materials published in the open literature until now and (ii) the essential features of an adsorption compression.

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