TRANSPORT PROPERTIES OF H_2 CONFINED IN CARBIDE-DERIVED CARBONS WITH DIFFERENT PORE SHAPES AND SIZES

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The structural variety, high specific surface area, large pore volume and relatively low cost make microporous carbons a promising candidate as adsorbents for hydrogen storage. Hydrogen adsorption in highly porous carbon with well-defined pores, with three different shapes [1], and different sizes ranging from < 1 nm to 30 nm is investigated. Using a combined approach of volumetric gas adsorption method and *in situ* quasi-elastic neutron scattering method the relationship between final macroscopic intake properties, details of the local adsorbent structure and the molecular behaviour of confined hydrogen is established. It is shown that pores of spherical and cylindrical shape strongly limit the diffusion of H_2, (Fig. 1) and thus, enhance the H_2 storage capability of carbons with well-tailored pore structure. In mesoporous carbide-derived carbon, the formation of a hydrogen layer with reduced mobility close to the pore walls is observed. With the increase in the amount of confined hydrogen and the occupation of the centre pore area, the mobility of confined H_2 increases in a jump-like fashion. Surprisingly, the increase of hydrogen diffusion is also observed at higher hydrogen loadings, indicating that cooperative H_2–H_2 interactions might play a role.

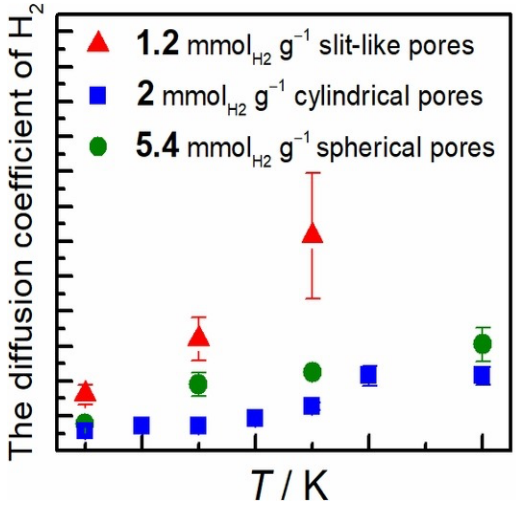

Fig.1

References

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