HYDROGEN STORAGE AND MOBILITY DETERMINED FOR VARIOUS ORGANICALLY FUNCTIONALISED POROUS SILICA SYNTHETISED BY USING THE POST-GRAFTING METHOD

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Abstract

Various aspects as pore size, surface area, functionalization and pore volume of materials have to be considered when are envisaged increased hydrogen storage performances [1, 2]. Different materials were synthetized by using the post-grafting method in alkaline conditions, through a modified Stöber process. Starting the simple silica, it was used the long chain cationic surfactant, hexadecyltrimethylammonium bromide (CTAB) [3], and different organically silica precursors: tetraethyl orthosilicate and various trialkoxysilanes with different functional groups. By properly tuning surface interactions and textural characteristics, the overall efficiency of hydrogen capture processes could be improved. Hydrogen adsorption capacity was evaluated by using volumetric apparata and the performances obtained for the methyl-functionalized sample can be debited to a different sorbent-adsorbent interaction and textural properties developed. An NMR investigation aiming at clarifying the internal arrangement and diffusion properties of hydrogen molecules inside functionalized porous silica materials has been performed. The NMR spectral analysis and the T1 relaxation times [4], both carried out under different pressure loadings, indicated two different populations of hydrogen sorbate due to the molecules adsorbed in mesopores and in micropores.

References

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