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Hydrogen storage comparison of Cu-BTC and Fe-BTC

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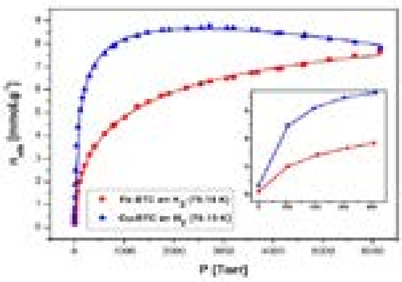
The search for materials with structural characteristics that allow for proper adsorption of either greenhouse gases (CO2, CH4) or energy carrier gases (H2) is nowadays one of the main research lines in the scientific community. This contribution reports a comparative study of the hydrogen storage in two metal organic frameworks (MOFs), Fe-BTC and Cu-BTC. Both materials were obtained by solvothermal technique and then characterized from XRD, FTIR, UV-vis, XPS, Mössbauer and magnetic measurements. A detailed analysis on the possible guest-host interactions for the hydrogen molecules in the porous framework of these materials is discussed. These frameworks present promising potential as storage materials due to large surface area (more than 10^3 m^2/g), accessible pore volume between 45 and 55% of the total volume and high chemical and thermal stability. Adsorption isotherms were recorded in order to determine the H2 maximum adsorption capacities (Qmax) and to evaluate the adsorption heats (Hads) by the isosteric method. Results yielded good Qmax values (150-200 cm^3/g) and intermediate Hads (7-9 kJ/mol), which make Fe-BTC and Cu-BTC promising candidates for H2 storage. With the obtained data, the nature of the adsorbate-adsorbent interactions is discussed.



Biography

Neil Torres Figueredo completed his Engineering in Nuclear and Energetic Technologies at Higher Institute of Technology and Applied Sciences in Havana, Cuba in July 2008 and his Master of Advance Technology at Research Center for Applied Science and Advanced Technology (CICATA-Legaria) of IPN, Mexico in December 2014. At present, he is a Researcher at Center of Applied Technology and Nuclear Development in Havana, Cuba and a PhD student at Research Center for Applied Science and Advanced Technology of IPN, Legaria Unit, Mexico. He has published two research articles and participated in about 10 international scientific meetings held in Cuba, Mexico, Brazil, Argentina and EEUU and has done research on the synthesis, characterization and evaluation of the porous materials promising for storage and gases capture.

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