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Poster Acceptance Letter

ABSTRACT REFERENCE NUMBER: COLL2021_0006 (Please quote in all correspondence)

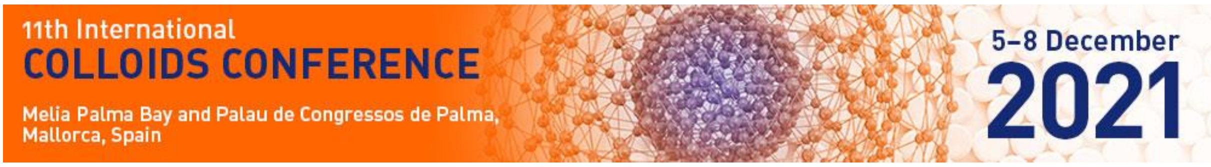
30 July 2021

Dear Juliana M. Juarez,

Thank you for submitting an abstract to present at the ***11th International Colloids Conference***. On behalf of the Organising Committee, I am delighted to inform you that your abstract entitled **'Mesoporous carbon CMK-3 modified with zirconia developed by direct synthesis technique applied in energy storage.',** has been accepted for **Poster Presentation** at the Conference.

Your abstract details are as below:

Title:	**Mesoporous carbon CMK-3 modified with zirconia developed by direct synthesis technique applied in energy storage.**
Authors:	**Lisandro F. Venosta, Juliana M. Juarez, Oscar A. Anunziata, Marcos B. Gómez Costa**
Presenting Author:	**Juliana M. Juarez**



Mesoporous carbon CMK-3 modified with zirconia developed by direct synthesis technique applied in energy storage

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Nanostructured carbon material (CMK-3) modified with zirconium oxide was synthesized by a new direct synthesis technique. Zirconium oxide dispersed in carbon materials (Zr-CMK-3) were characterized by X-ray diffraction, textural properties, UV-Vis-DRS, XPS, and transmission electron microscopy analysis.

The goal of this new synthesis method is to avoid the use of inorganic siliceous template (SBA-15), which leads to a shorter and cheaper way to obtain mesoporous carbon, and at the same time incorporate into the framework Zirconium atoms.

Zr-CMK-3 material significantly improved H_2 storage behavior (4.6% by weight at 77 K and 10 bar) compared to CMK-3 support. The synthesized material is promising in the absorption of hydrogen by weak bonding forces (physisorption).

The activity of the samples to the adsorption of hydrogen molecules is attributed to the improved dispersion of the zirconium oxide, as well as the appropriate use of support, which can probably disperse the zirconium on its large surface area, allowing a great dispersion of the zirconium.

The Zr^{+4} cation is an active species to absorb and store hydrogen through a physisorption process and the carbon plays an important role in the dispersion and size of metal particles.

A hydrogen storage mechanism on the active surface of the ZrO_2 clusters was proposed. First layer of hydrogen molecules can react with the metal cation through a dihydrogen complex (Kubas interaction). The second layer of hydrogen molecules adsorbed around the metal oxide clusters is due to dipole-like interactions, this is because the metal particle induces dipole forces on the hydrogen molecule. The other layers could also interact by dipole forces; however, the interaction force decreases as the distance to the surface increases. The upper layers could interact with the metal cation by dipole-induced bonding; however, the interaction force decreases as the distance to the surface increases.