SYNTHESIS AND CHARACTERIZATION OF POROUS CARBON CUBOIDS FOR THE DEVELOPMENT AND APPLICATION OF NANOBIOCATALYTIC SYSTEMS FOR THE BIOLOGICAL PRODUCTION OF HYDROGEN

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ABSTRACT

Carbon cuboids belong to the broad family of the porous carbon materials, which present excellent properties. The ultra-hydrophilic character, the great stability, the light weight, the heterogeneity of the surface and the high hierarchical porosity (~900 m^2/gr) are some of their characteristics that render them an ideal material for energy and catalytic applications. One of the most important advantages against other carbon materials is that the surface of carbon cuboids is decorated with oxygen functional groups after their synthesis, without using any further oxidation procedures. It is worth noting that carbon cuboids are thermal stable up to 500 ^oC, much higher temperature in relation to other carbon materials.[1, 2]

In this study, porous carbon cuboids were synthesized by immobilizing Cu and characterized via a variety of techniques, such as mid-infrared spectroscopy (FT-IR), nitrogen porosimetry (BET), thermogravimetric analysis (TGA), Raman spectroscopy and scanning electron microscopy (SEM). These carbon materials were used as supports for the immobilization of cellulase from *Trichoderma reesei*. Immobilized cellulase was biocatalytically characterized (e.g., activity, stability, and reusability) to demonstrate its application in producing sugars that will be used in the next step for bioconversion towards hydrogen.

KEYWORDS: Porous carbon materials, biocatalysis, cellulase, hydrogen.

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