Clay-based bionanocomposite foams: morphology and porosity characterization by X-ray microtomography technique

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X-ray microtomography is an useful technique increasingly applied to characterize the textural properties of cellular solids allowing to determine morphology, texture, variable density elements, surface area, interconnectivity, structure thickness, pore volume, mean pore diameter and porosity (closed and open). This technique has been here applied characterization of bionanocomposite foams. This type of biohybrid nanomaterials produced by the assembly of biopolymers and inorganic particles, can be conformed as low-density macroporous solids (foams), deserving advanced applications such as acoustic insulation, fire retardant materials, removal of pollutants from water, biocatalysis, biomedicine, sensing and energy storage [1-2]. This work introduces results on X-ray microtomography of bionanocomposite foams formed from the association of polysaccharides such as chitosan, starch and alginate, with clay nanoparticles of lamellar (vermiculite) or fibrous (sepiolite) morphology and produced by freeze-drying of the bionanocomposite hydrogels. The resulting foams show interconnected elongated macropores highly porous (*e.g.,* 90% porosity) with appropriate mechanical properties for diverse applications. In the case of functional bionanocomposites based on the intercalation of the cationic biopolymer chitosan in natural or in organically modified vermiculite samples, these foams have the ability to remove Cd(II) ions from aqueous solution [3]. On the other hand, the bionanocomposite foams prepared by mixing starch, alginate and sepiolite show excellent fire retardant properties.

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