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“Cellulose-hybrid aero/xerogels for sorption of gas, moisture and cationic compounds.”

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Abstract

In many applications absorption of compounds is of interest. This relates for example to absorption of toxic gases in industrial applications or the removal of heavy metals in effluents or to the regulation of humidity by the sorption of moisture. The possibilities for controlling and/or absorbing these matters is therefore highly interesting. Amorphous cellulose-hybrid aero/xerogel particles are here an interesting material. In a hydrophilic state the material has a high capability of directly adsorbing moisture by its large content of hydroxyl groups. Converting to a hydrophobic matter by the incorporation of lignin in the particles, sorption of gases may be facilitated. In general, the number of hydroxyls and acidic groups, as for instance carboxylic acid groups, control moisture adsorptivity and binding of cations in these types of materials. Utilising the jet-cutter technique the production of regular, small gel particles in large quantities is possible. By blending the cellulose with quantities of charged polysaccharides the hydrophilic sorption capacity as well as the stiffness of the particles may be regulated. By blending the cellulose with, earth's third most common polymer lignin, hydrophobic aerogel/xerogel particles are obtained for gases and cationic matter. The gel particles may be dried either by super critical CO₂ producing aerogels or just in air producing xerogels depending on its usage. The relation between the composition and properties of these aerogel/xerogel particles is further dealt with.

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