Cellulose aerogel particles via emulsion technique

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Bio-aerogels are a new generation of porous materials made from polysaccharides. They show high porosity (> 90 %), high specific surface area (200 – 500 $m^2.g^{-1}$) and low density (around 0.1 $g.cm^{-3}$). All these properties place them as excellent candidates for multiple applications in various fields such as drug delivery systems for medical and pharma applications, and also materials for catalysis, absorption and adsorption. Thus far, most of the produced aerogels were shaped in form of monoliths of a few cubic centimetres of volume for easy handling in laboratory preparations. However, several applications have specific requirements in terms of shape and size, i.e. as beads or particles. In addition, all processing steps (solvent exchange, drying) are much quicker when samples are of sub-millimetre size.

In this work we used emulsion technique to produce cellulose aerogel beads with diameter around few tens of microns. Cellulose was dissolved in 8%NaOH-water and different additives, such as urea and ZnO, were used to delay solution gelation. "Wet" beads were obtained via double emulsion approach and cellulose non-solvent induced phase separation. Supercritical drying was used to obtain dry cellulose aerogel particles. Their density was around 0.1 $g.cm^{-3}$ and specific surface area of 320 $m^2.g^{-1}$.

Acknowledgements:
This project has received funding from the European Union´s Horizon 2020 research and innovation program under grant agreement No 685648, "Nanohybrids" project.