SUPERCRITICAL IMPREGNATION OF CELLULOSE WITH ACTIVE COMPOUNDS

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Cellulose is the most abundant biomass material in the nature. Microcrystalline cellulose has many applications in pharmaceuticals, foods, papers and structural composites. Major studies over the last decades have shown that cellulose nanoparticles could be used as fillers to improve mechanical and barrier properties in biocomposites. Besides reinforcing effect, nanoparticles can be used to improve specific functions like active or smart properties of packaging, *i.e.*, antimicrobial activity, enzyme immobilization and biosensing. In this sense, the cellulose impregnation with active substances is an attractive method to modified specific activity in this kind of applications. Particularly, the use of supercritical fluids as carrier for the impregnating agent is an useful technology. Supercritical media allows to increase diffusion coefficients and to decrease viscosities. Also, the absence of surface tension in these fluids enhances mass transfer and lead to deeper substance penetration.

On the other hand, capsaicin is the active component of chili peppers. Besides of food applications, this substance is used in medicine as pain reliever in cream or in topical ointments, as well as a high-dose dermal patch and in agriculture as repelent of mammarial.

In this work, supercritical carbon dioxide is used to impregnate microcrystalline cellulose with capsaicin, in order to give a specific activity for applications in medical/pharmaceutical device or agricultural packaging. The effect of pretreatment, pressure, time, venting and co-solvent on impregnation efficiency as well as, the desorption behavior is explored.

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