Templated and activated carbons for the adsorption and controlled release of drugs

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The development of a drug delivery system comprises different aspects, being the drug delivery materials one of the most relevant. A variety of drug carriers have been studied in literature, mostly polymers and silicas. In this work, we propose porous carbons as a good candidates for drug release systems, due to the properties that make them adequate for this application: large pore volume, high surface area, tailored pore size and surface chemistry. Three carbons with different nanostructure and porosity were selected: commercial activated carbon (SXPlus), carbon with ordered mesoporosity (CMK-3), and carbon submicrocapsules with a hollow nucleus and a mesoporous shell (CSC). CMK-3 and CSC were obtained by the template method using SBA15 and a home-made silica template, respectively, and a commercial resol resin as carbon precursor. Ibuprofen was selected as a model drug for de adsorption and release experiments. The adsorption behaviour of ibuprofen in these materials were analysed. The CSC and SXPlus carbons showed higher adsorption capacity that CMK-3, reaching up to 300 mg/g for CSC, which was ascribed to the higher surface area of these carbons (1100 and 1200 m^2/g, respectively). Drug release studies were carried out in vitro at pH 7.4, showing that most of ibuprofen was delivered within 5 hours, with differences between the three carbons associated to their different porosity and nanostructure.