042

MOF-based porous microspheres: Innovative hybrid materials for CO_2 adsorption

Yassine Khadiri,[a,b] Christophe Volkringer,[a] Aïcha Anouar,[b] Sebastien Royer[a], Abdelkrim El Kadib,[b] Jérémy Dhainaut,[a] Thierry Loiseau[a]

[a] *Univ. Lille, CNRS, Centrale Lille, Univ. Artois, UMR 8181 – UCCS – Unité de Catalyse et Chimie du Solide, F-59000 Lille, France.*

[b] *Euromed Research Center, Engineering Division, Euro-Med University of Fes (UEMF), Route de Meknes, Rond-point de Bensouda, 30070 Fès, Morocco.*

e-mail: yassine.khadiri.etu@univ-lille.fr

Nowadays, no one can deny anymore that CO2 emission is one of the major problems that our planet suffers from, and its continued ejection into the atmosphere is a real threat to many species on Earth. For this reason, different carbon capture and storage technologies have been proposed to control and overcome this humanity's challenge. Among these, CO2 adsorption using porous materials is one of the main approaches developed, with pilot plants built all around the globe. Metal Organic Frameworks (MOFs) are one of the new porous materials classes that have invaded not only the gas adsorption domain but also several other fields of chemistry owing to their high porosity and structural flexibility. However, their large-scale use remains limited due to their difficult processing and their low chemical and thermal stability. In our study, HKUST-1 was chosen, as one of the most studied MOFs for CO2 sorption, to be grown in a chitosan matrix in order to facilitate its shaping and improve its textural properties. After a simple atmospheric drying, it was possible to develop robust microspheres with high crystallinity and a specific surface area exceeding 800 m2 g-1. The as-prepared CS@HKUST-1 composites were then used for CO2 adsorption, where they showed high adsorption capacity (2.59 mmol/g at 298 K). This is the first time that a MOF/bio-polymer-based composite presents such high adsorption capacity, in line with liquid amines, and further developments are envisaged.

Figure 1: As-prepared composites microspheres after atmospheric drying.