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New guest accessible space under gas pressure

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A two-dimensional (2-D) coordination polymer {[Zn(L)4]·DMF·H2O}n, (1), prepared by the reaction of 4-(1H-benzo[d]imidazol-1-yl)benzoic acid with Zn(NO3)2·4H2O under solvothermal conditions, can adapt its structure during supercritical carbon dioxide (CO2) guest-exchange and CO2 sorption. The 2-D layers of the coordination polymer are associated by weak interactions that enable the framework to undergo guest-induced expansion and contraction. At high pressure, additional space is created between adjacent layers resulting in a significant increase in the CO2 sorption capacity (Figure 1). Moreover, the structural changes and gas uptake by the host occur preferentially for CO2 at 25 °C while nitrogen (N2) and methane (CH4) are not adsorbed under the same conditions. Pressure differential scanning calorimetry (PDSC) and in situ single-crystal X-ray diffraction (SCD) experiments under gas loading were carried out to obtain insight into the dynamic behaviour of the framework.

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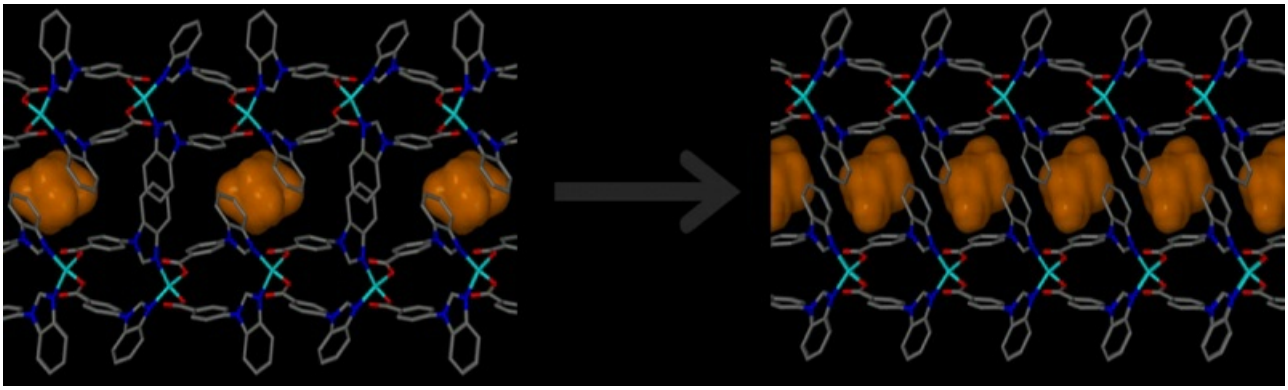

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