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Mechanical alloying of MOFs and selective capture of 1,3-butadiene

Satoshi Horike[1]
[1]*Institute For Integrated Cell-Material Sciences, Kyoto University, Kyoto, Japan*
E-mail: horike@icems.kyoto-u.ac.jp

Development of new synthetic methodology of metal organic framework (MOF) is of significant challenge because most of combination of simple and versatile metal ion and ligand is well developed. Here we present the solvent-free mechanical milling process for two or more distinct MOFs induces the formation of a new phase of MOF solid solution.[1] Mechanical milling under an Ar atmosphere promotes the high diffusivity of each metal ion in an amorphous solid matrix; the amorphous state turns into the porous crystalline structure by vapor exposure treatment. Based on our MOF design, we also report the selective capture of 1,3-butadiene gas over other six C4 isomer gases at 25 degC and ambient pressure.[2] [Zn(NO2ip)(dpe)] (NO2ip=5-nitroisophthalate, dpe=1,2-di(4-pyridyl)ethylene) shows selective 1,3-butadiene sorption because of its isolated voids which is fitted for the shape of 1,3-butadiene molecule. The mechanism of mechanical alloying and 1,3-butadiene accommodation will be discussed.

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