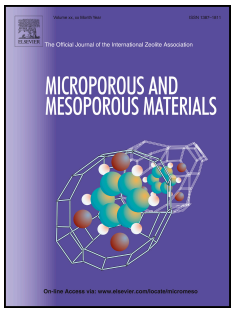
Accepted Manuscript



Morphology control by modulated synthesis of metal-organic framework CPO-27

Mali H. Rosnes, Fredrik S. Nesse, Martin Opitz, Pascal D.C. Dietzel

PII: S1387-1811(18)30468-2

DOI: 10.1016/j.micromeso.2018.08.027

Reference: MICMAT 9089

To appear in: *Microporous and Mesoporous Materials*

Received Date: 25 May 2018

Revised Date: 3 August 2018

Accepted Date: 25 August 2018

Please cite this article as: M.H. Rosnes, F.S. Nesse, M. Opitz, P.D.C. Dietzel, Morphology control by modulated synthesis of metal-organic framework CPO-27, *Microporous and Mesoporous Materials* (2018), doi: 10.1016/j.micromeso.2018.08.027.

Morphology control by modulated synthesis of metal-organic framework CPO-27

Mali H. Rosnes,[a] Fredrik S. Nesse,[a] Martin Opitz,[a,†] and Pascal D. C. Dietzel[a,*]

[a]Department of Chemistry, University of Bergen, P.O. Box 7803, N-5020 Bergen, Norway.

†Current address: Forschungsinstitut Edelmetalle + Metallchemie, Katharinenstraße 17, 73525 Schwäbisch Gmünd, Germany.

*Email: Pascal.Dietzel@uib.no

KEYWORDS: CPO-27-M, MOF-74, Metal-Organic Framework, Crystal Shape, Morphology, ESI-MS, Crystal Engineering, Modulator approach.

ABSTRACT: The CPO-27/MOF-74 series is among the most investigated metal-organic frameworks because of their usefulness in a diverse range of applications. For specific applications, it will be important to control the shape and size of the crystallites of the material. The modulation approach has been successfully used to direct these parameters in the synthesis of MOFs. Here, we report the synthesis of CPO-27-Ni in the presence of different ratios of benzoic acid and acetic acid as modulators. Yields, powder X-ray diffraction data, scanning electron microscopy results, and elemental, thermogravimetric, and gas sorption analyses are compared to study the influence of the modulator on the product. The results show that we have successfully synthesized pure CPO-27-Ni independent of the amount of modulator. The modulator affects the resulting morphology of the crystalline product with a defined variation of particle sizes and shapes. In addition, ESI-MS has been employed in probing the reaction solutions. It shows the preferred formation of complexes between the metal cation and the modulator, thus indicating that the ligand substitution plays a major role in the crystal growth.