**Impact of Liquid-mixing Synthesis on Crystal Formation of Zeolitic Imidazolate Frameworks**

Chao Zhou,1 Malwina Stepniewska,1 Thomas D. Bennett,2 Yuanzheng Yue1

1Department of Chemistry and Bioscience, Aalborg University, DK-9220 Aalborg, Denmark

2Department of Materials Science and Metallurgy, University of Cambridge, CB3 0FS, UK

E-mail of the presenter:[*czh@bio.aau.dk*](mailto:czh@bio.aau.dk)

A number of zeolitic imidazolate frameworks (ZIFs) attract much attention owing to their high thermal stability, high surface area and glass forming ability [1,2]. Various methods of synthesizing ZIFs have been also developed [3]. However, the relations between the synthesis condition, the crystal morphology and the properties of ZIFs need to be investigated. In the present work, we study the synthesis time and temperature effects on the crystal formation, morphology and crystal size of [Zn(Im)2] by using the liquid mixing method. The X-ray diffraction results indicate that the stirring time for synthesis significantly influences the structure and topology of crystals. The crystals are transformed from ZIF-coi, through ZIF-zec, ZIF-nog, to ZIF-zni with the increase of the synthesis time from 18 to 120 hours at room temperature. However, altering synthesis temperature from 10 to 35 oC does not change the identity of the crystals, i.e., we always obtain the ZIF-zec crystals. The crystal morphology, surface area and mass loss of the crystals were characterized by scanning electron microscopy, nitrogen absorption spectroscopy, and thermogravimetry, respectively. The mass of the products slightly decreases during heating to their decomposition temperature. The particle size and shape of crystals depend on the synthesis conditions. The nitrogen absorption results show that both the ZIF-nog obtained at room temperature and the ZIF-zec synthesized at 30 oC have a Brunauer–Emmett–Teller (BET) surface area of >500 m2/g. This work helps to better understand and control the ZIF crystal formation.

[1] T. D. Bennett, J. C. Tan, Y. Z. Yue, et al., *Nat. Commun.* 6 (2015) 8079.

[2] H. Tao, T. D. Bennett, Y. Z. Yue, *Adv. Mater.* 29 (2017) 1601705.

[3] Y. Q. Tian, Y. M. Zhao, Z. X. Chen, et al., *Chem. Eur. J.* 13 (2007) 4146.