

Supporting information

Synthesis and Gas Sorption Properties of Nano Zeolitic Imidazolate Frameworks

Satish K. Nune,^a Praveen Thallapally,^{a,*} Alice Dohnalkova^b, Chongmin Wang^b Jun Liu,^c
Gregory J Exarhos,^c

Materials and Methods

All Chemicals used in the synthesis of NZIF-8 were obtained from commercial sources and are used without further purification. Size and shape of the NZIF-8 was determined by Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM).

Synthesis of NZIF-8: The hexagonal shaped nanosized NZIF-8 have been synthesized via the simple mixing of zinc nitrate hexahydrate (50.00 mg, 0.17 mM) with 2-methyl imidazole (91.53 mg, 1.34 mM) at room temperature in the presence of methanol (10 mL) and 1 % high molecular weight poly(diallyldimethylammonium chloride) solution (average M_w 400,000-500,000) (10 mL) and the reaction mixture is stirred continuously for 24 h to obtain white colloidal suspension. After repeated centrifugation (at high speed; 13,000 rpm) of reaction mixture and washings with water and methanol (2 times) to get rid of un-reacted starting materials followed by air drying led to the formation of pure NZIF-8.

Transmission Electron Microscopy (TEM)

TEM images were obtained by evaporating a drop of aqueous dispersion of poly(diallyldimethylammonium chloride) stabilized ZIF-8 nanocrystals (NZIF-8) on carbon-coated copper grids followed by the measurement on Tecnai T-12 TEM operating at 120 kV. Images were collected digitally using Gatan 2x2K CCD. The nanoparticle size and size distribution was calculated by measuring over 300 nanoparticles per sample.

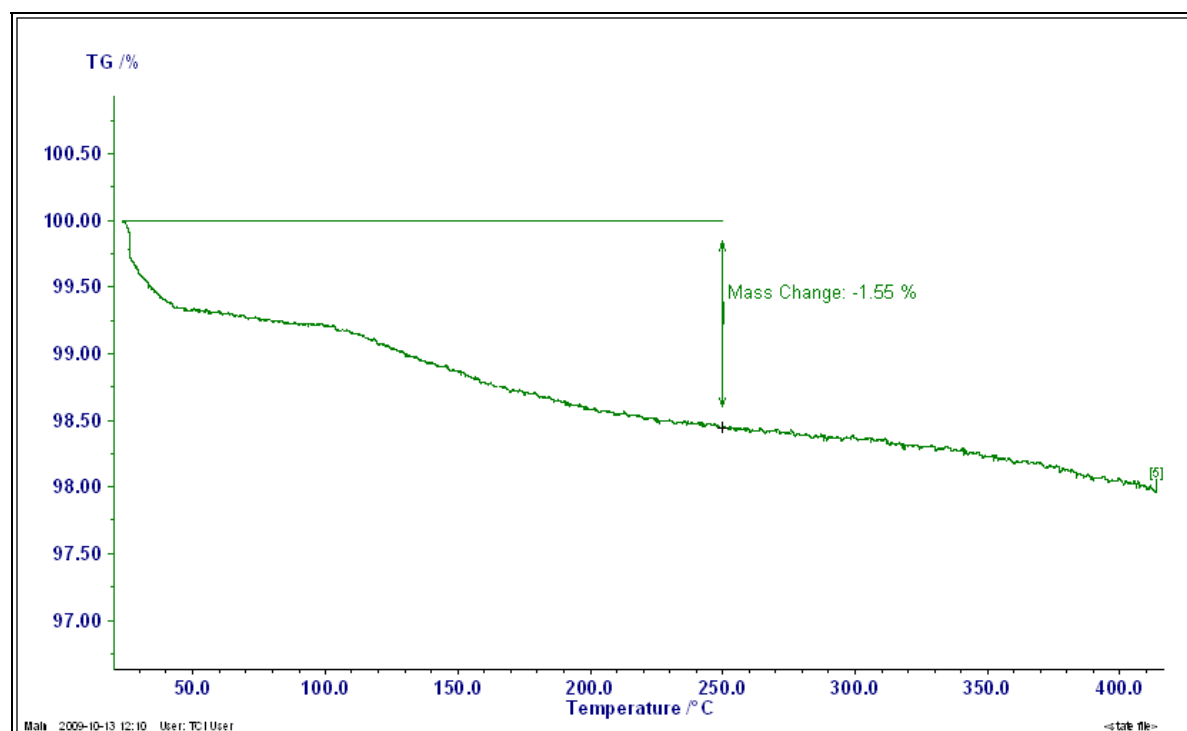


Figure 1. Thermogravimetric analysis of as-synthesized nZIF-8.

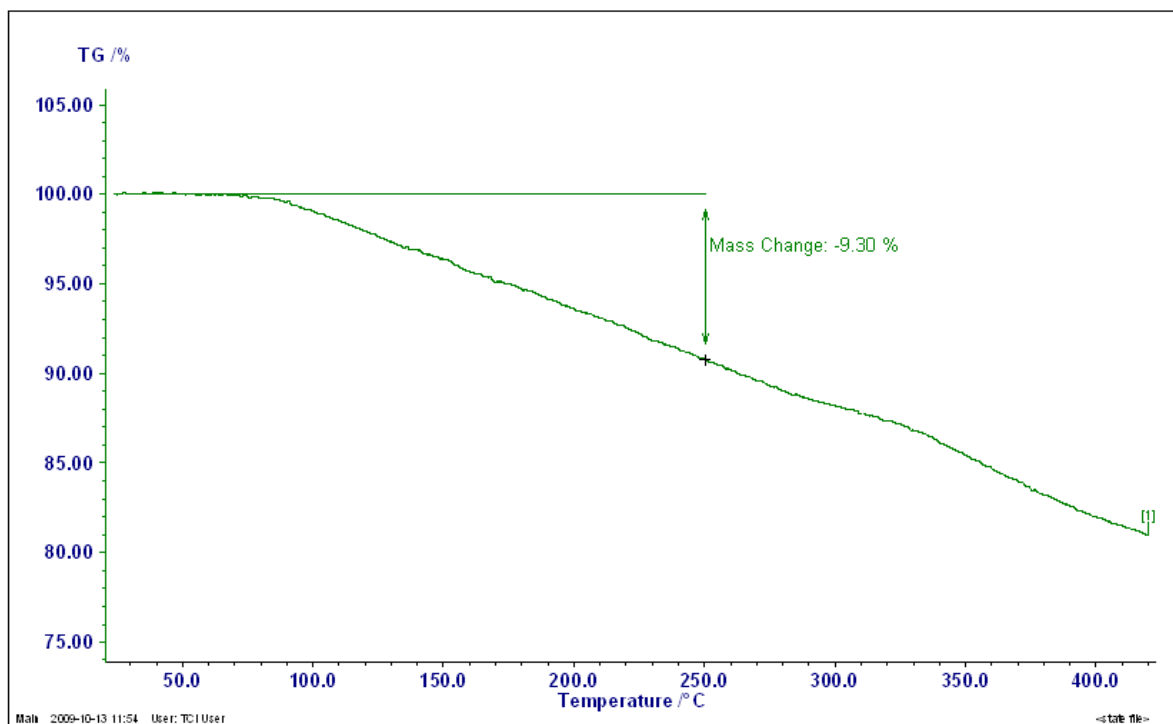


Figure 2. Thermo gravimetric analysis of as-synthesized ZIF-8 (using the protocol developed by Yaghi and co-workers, referece 3a in the main mainscript)

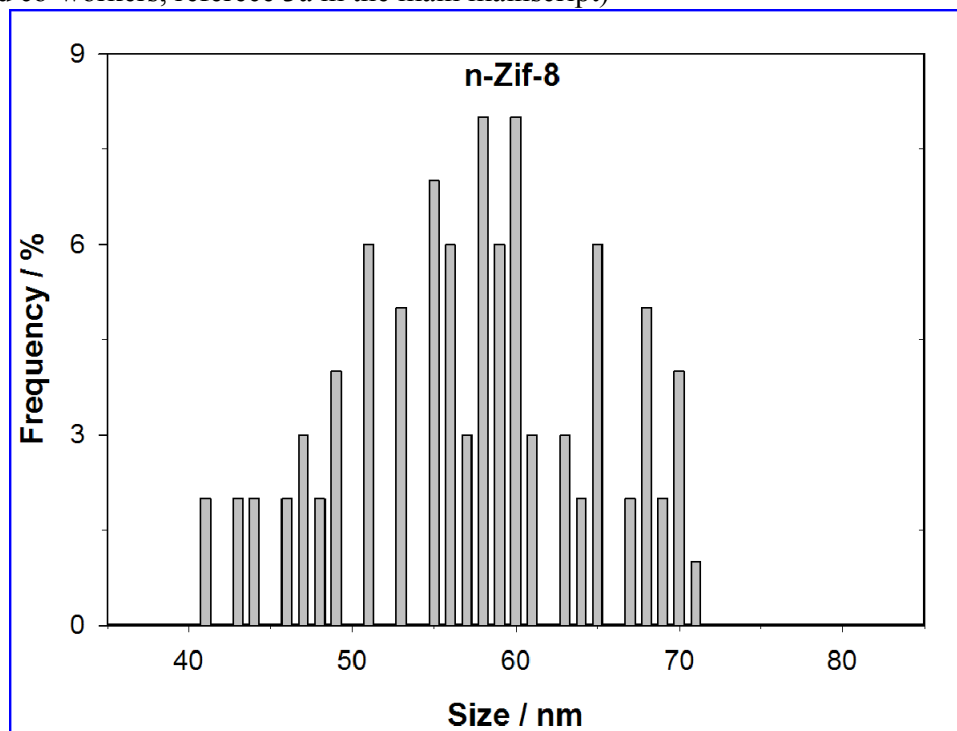


Figure 3. The average size distribution of nZIF-8.

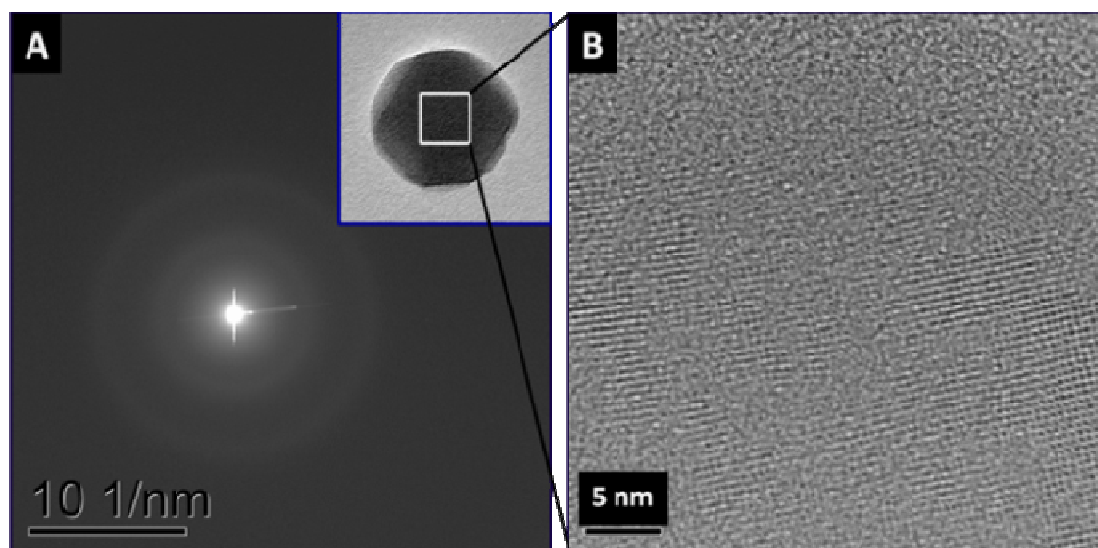


Figure 4. A) Electron diffraction pattern taken with the incident beam perpendicular to the hexagonal nano ZIF-8 (B) HRTEM image

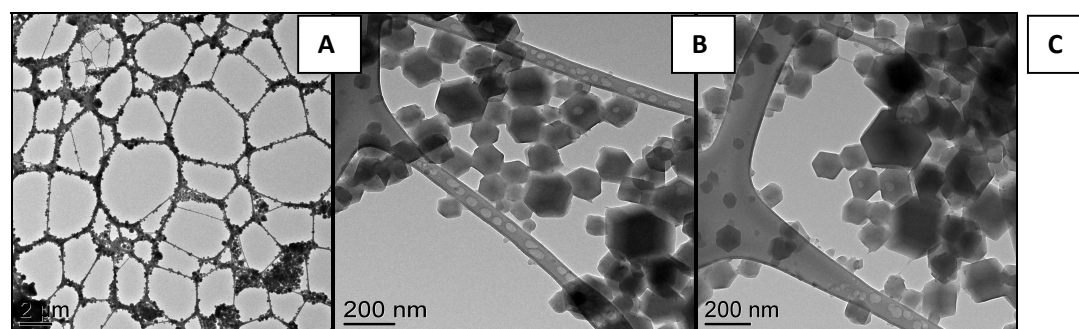


Figure 5. Transmission electron microscopy (TEM) image of nZIF-8 after VTi (A-C) Note that they do not differ from the as synthesized N-ZIF-8 (See Figure 2)

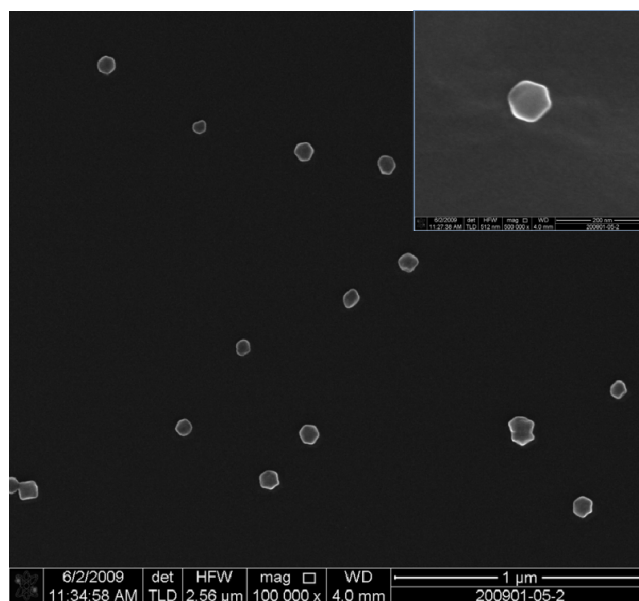


Figure 6. Scanning electron microscopy (SEM) image of nZIF-8