

Supporting Information

**Direct synthesis of Cu-BDC frameworks on a quartz crystal
microresonator and their application to studies of n-hexane adsorption**

*Changyong Yim and Sangmin Jeon**

*Department of Chemical Engineering, Pohang University of Science and Technology
(POSTECH), Pohang, Gyeongbuk, Republic of Korea*

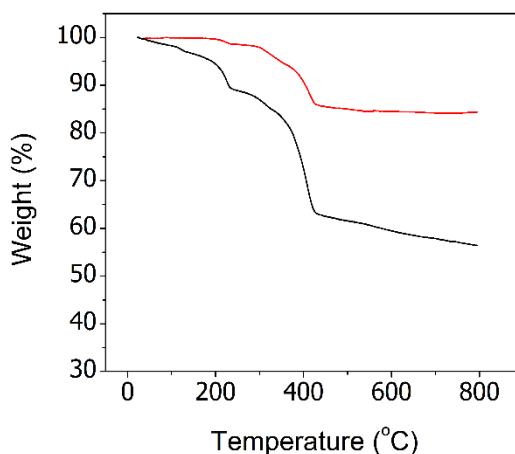


Figure S1. Temperature dependent variations in the weight percentage of Cu-BDC powders (black) synthesized using the conventional method and Cu-BDC powders obtained from CuBDC-Si (red). They showed almost identical changes in weight with temperature but the conventional Cu-BDC powders showed a greater decrease in weight because the Cu-BDC powders obtained by scratching the CuBDC-Si layer contained unreacted metallic copper. The decreases in the weight percentage at 210 °C and 420 °C were attributed to the evaporation of DMF from the framework and the thermal degradation of the framework, respectively. The TGA results were in good agreement with the reported results,¹ which indicate that the Cu-BDC was successfully synthesized on the copper-coated silicon wafer.

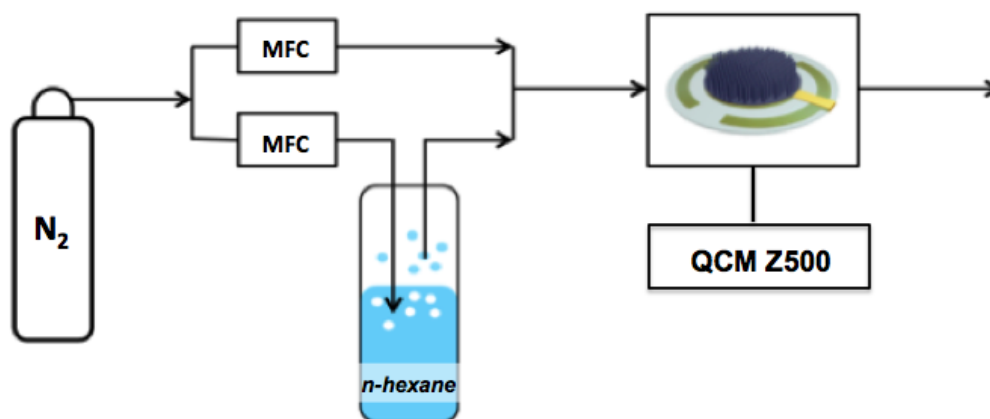


Figure S2. Schematic diagram of instrument set-up. After the CuBDC-QCM was mounted in a temperature-controlled flow cell, changes in the resonance frequency and Q factor were measured simultaneously as a function of n-hexane vapor concentration at 25 °C. Dry nitrogen was used as a carrier gas and passed through a gas bubbler containing n-hexane to generate vapor. The n-hexane vapor concentration was adjusted by combining an n-hexane vapor stream with a dry nitrogen stream. The flow rate of each stream was controlled using mass flow controllers (Brooks Instruments, Hatfield, PA) and the total flow rate was fixed at 100 mL/min. The concentration of n-hexane vapor was varied sequentially as follows: 3 %, 5 %, 7 %, 10 %, 15 %, 20 %, 30 %, and 40%. After each exposure of the quartz crystal to n-hexane vapor, the flow cell was rinsed with dry nitrogen to remove the adsorbed n-hexane vapor from the Cu-BDC layer. The resonance frequency and Q factor of the QCMs were monitored using an impedance analyzer (QCM Z500, KSV Instruments Inc., Finland).

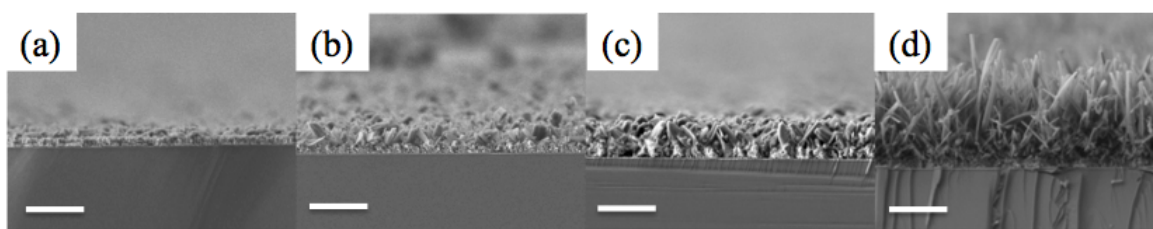


Figure S3. Side-view SEM images of Cu-BDC layers grown on silicon wafers using different concentrations of BDC. (a) 0.05 mM (b) 0.5 mM (c) 1 mM, and (d) 3 mM. The scale bar represents 2 μm .

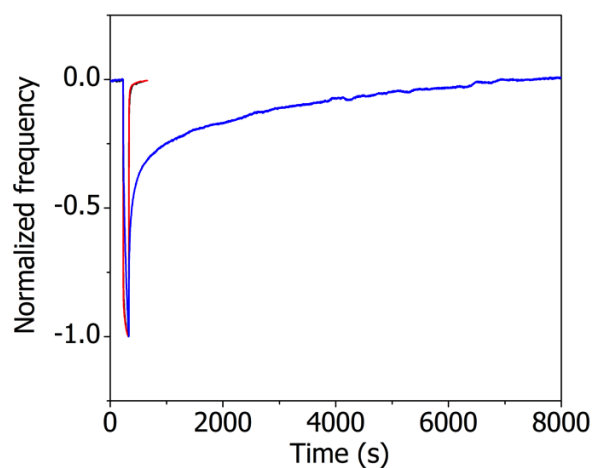


Figure S4. Variations in the normalized resonance frequency of superhydrophilic CuBDC-QCM (black), superhydrophobic CuBDC-QCM (red) and PS-QCM (blue) during the adsorption and desorption of 40% n-hexane vapor.

- [1] X. Wang, Q. Wang, Q. Wang, F. Gao, F. Gao, Y. Yang, H. Guo, *ACS Appl. Mater. Interfaces* **2014**, *6*, 11573.