

Electronic Supplementary Material

(ESI)

Amine-Modified MOF-14 as a Tunable Platform for CO₂ Adsorption and Supercapacitor Energy Storage

Pooja Sharda^a, Manisha^b, Anshu Sharma^c, Miroslav Almäši^{d#}, Ankur Jain^{a,e,f*}

^aCentre for Renewable Energy & Storage, Suresh Gyan Vihar University, Jaipur 302017 India

^bDepartment of Physics and Astrophysics, School of Basic Sciences, Central University of Haryana, Mahendragarh 123031, India

^cDepartment of Applied Sciences and Humanities, School of Engineering & Technology, Central University of Haryana, Mahendragarh 123031, India

^dDepartment of Inorganic Chemistry, Faculty of Science, P. J. Safarik University, Moyzesova 11, Kosice 041 54 Slovak Republic

^eNatural Science Centre for Basic Research & Development, Hiroshima University, Higashi-Hiroshima 739-8530 Japan

^fInstitute for Catalysis and Energy Solutions, College of Science, Engineering and Technology, University of South Africa, Private Bag X6, Florida, 1710, South Africa

Corresponding authors: *ankur.j.ankur@gmail.com; #miroslav.almasi@upjs.sk

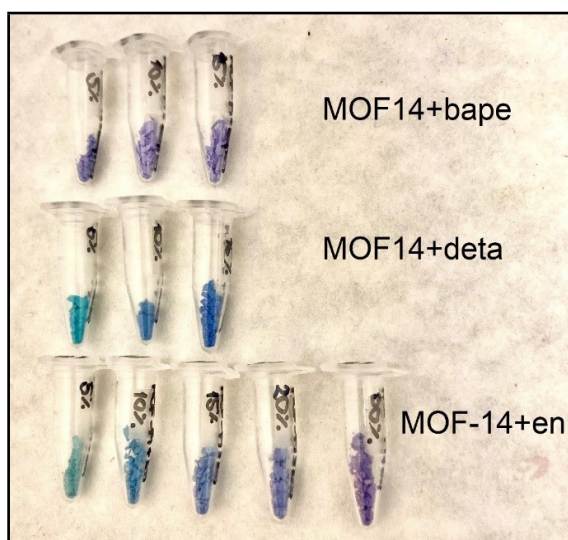


Figure S1 Prepared amine-modified MOF-14 samples with en (ethylenediamine), deta (diethylenetriamine), and bape (1,2-bis(3-aminopropylamino)ethane).

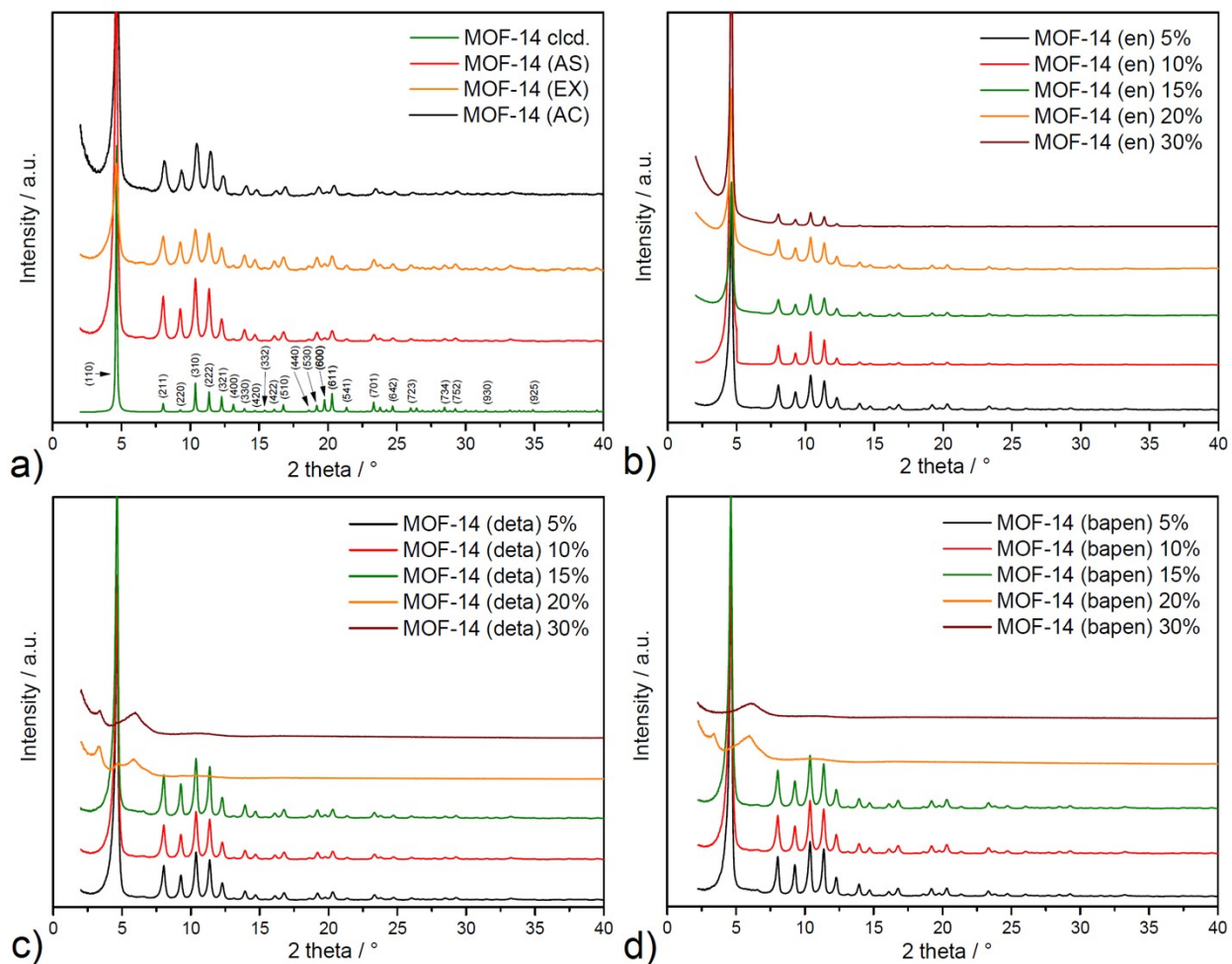


Figure S2 PXRD patterns of a) calculated and experimental MOF-14 samples (as-synthesized, solvent-exchanged, and activated) and materials obtained after post-synthetic modification with b) ethylenediamine (en), c) diethylenetriamine (deta), and d) 1,2-bis(3-aminopropylamino)ethane (bape) with different mass fractions (5, 10, 15, 20 and 30%).

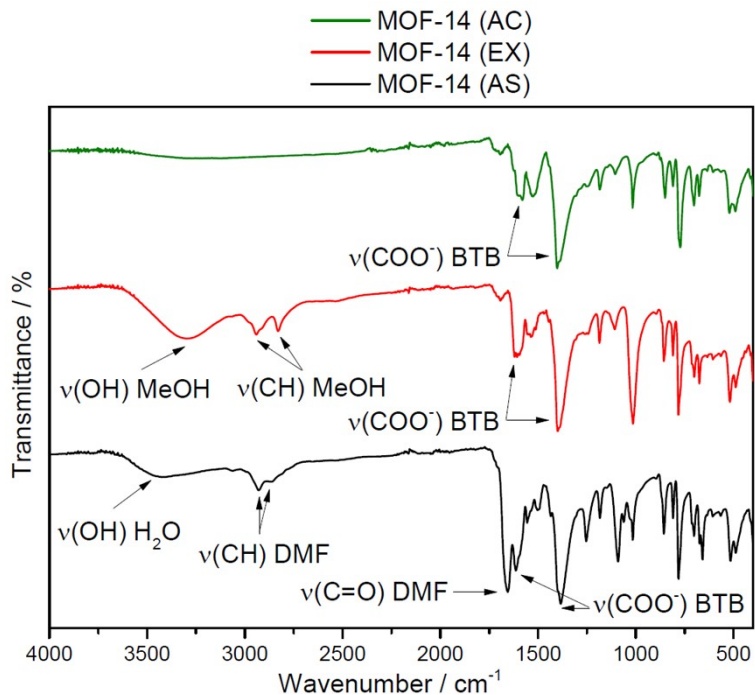


Figure S3 IR spectra of as-synthesized MOF (MOF-14 (AS), black line), methanol-exchange material (MOF-14 (EX), red line) and activated sample (MOF-14 (AC), green line) with an assignment of characteristic absorption bands.

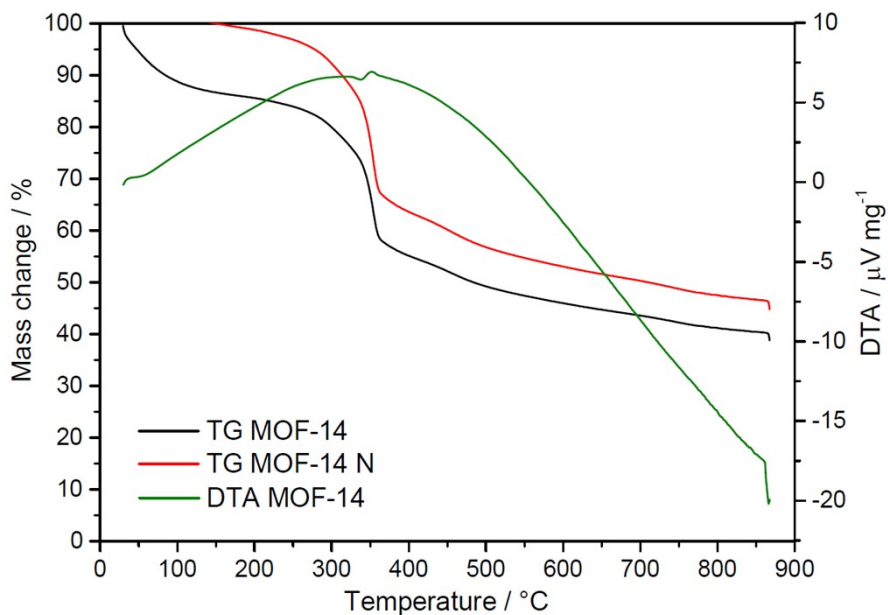


Figure S4 TG (black line), normalized TG (red line) and DTA curve (green line) of methanol-exchanged MOF-14 sample.

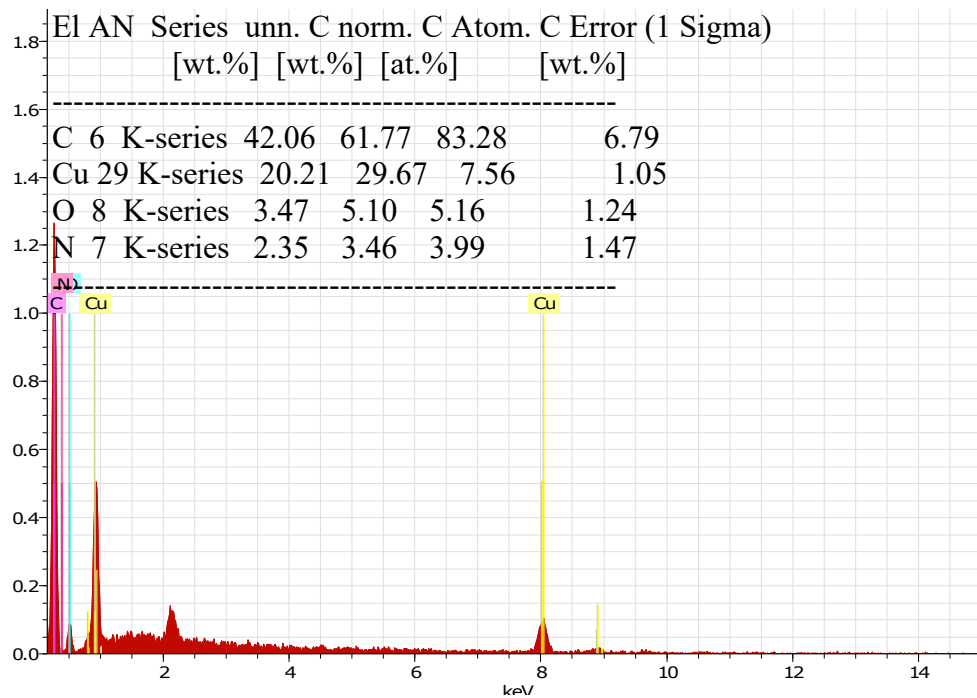


Figure S5 Energy-dispersive X-ray (EDX) spectrum of MOF-14 (en) 30% (inset shows the table with elements present in sample with corresponding weight and atomic %).

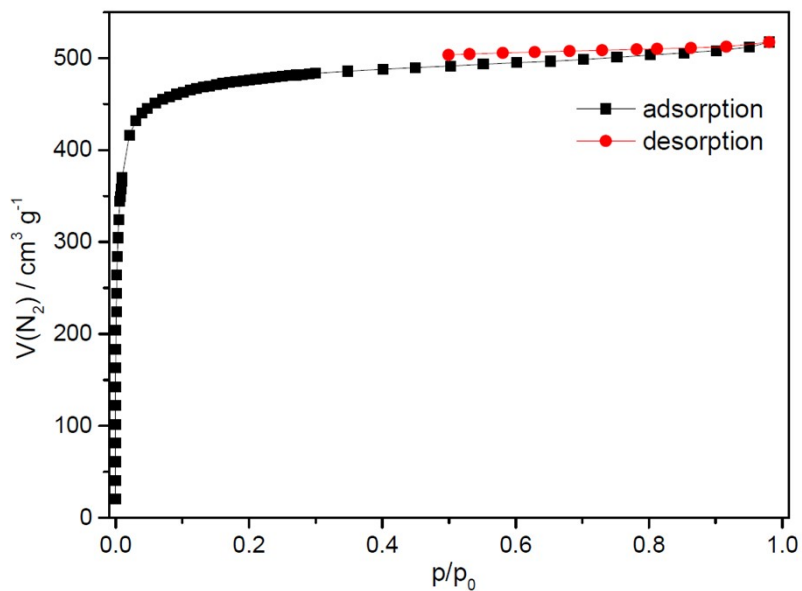


Figure S6 Nitrogen adsorption/desorption isotherm of activated MOF-14 (AC) measured at -196 °C.

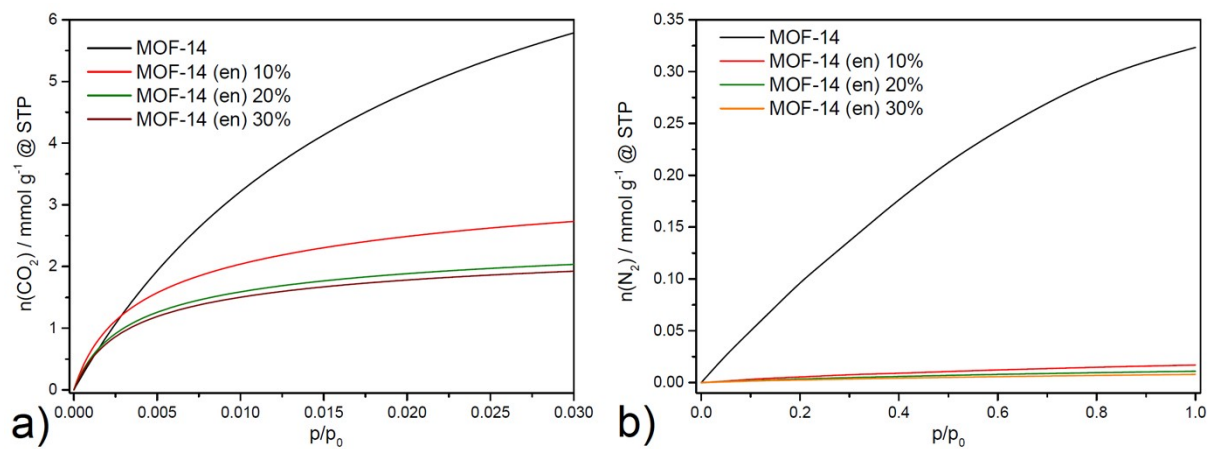


Figure S7 a) Carbon dioxide and b) nitrogen adsorption isotherms of activated MOF-14 (AC) and en-modified samples MOF-14 (en) 10%, MOF-14 (en) 20% and MOF-14 (en) 30% measured at 0 °C.