

Supplementary materials for the manuscript entitled:

Seeded growth of ZIF-8 on the surface of carbon nanotubes towards self-supporting gas separation membranes

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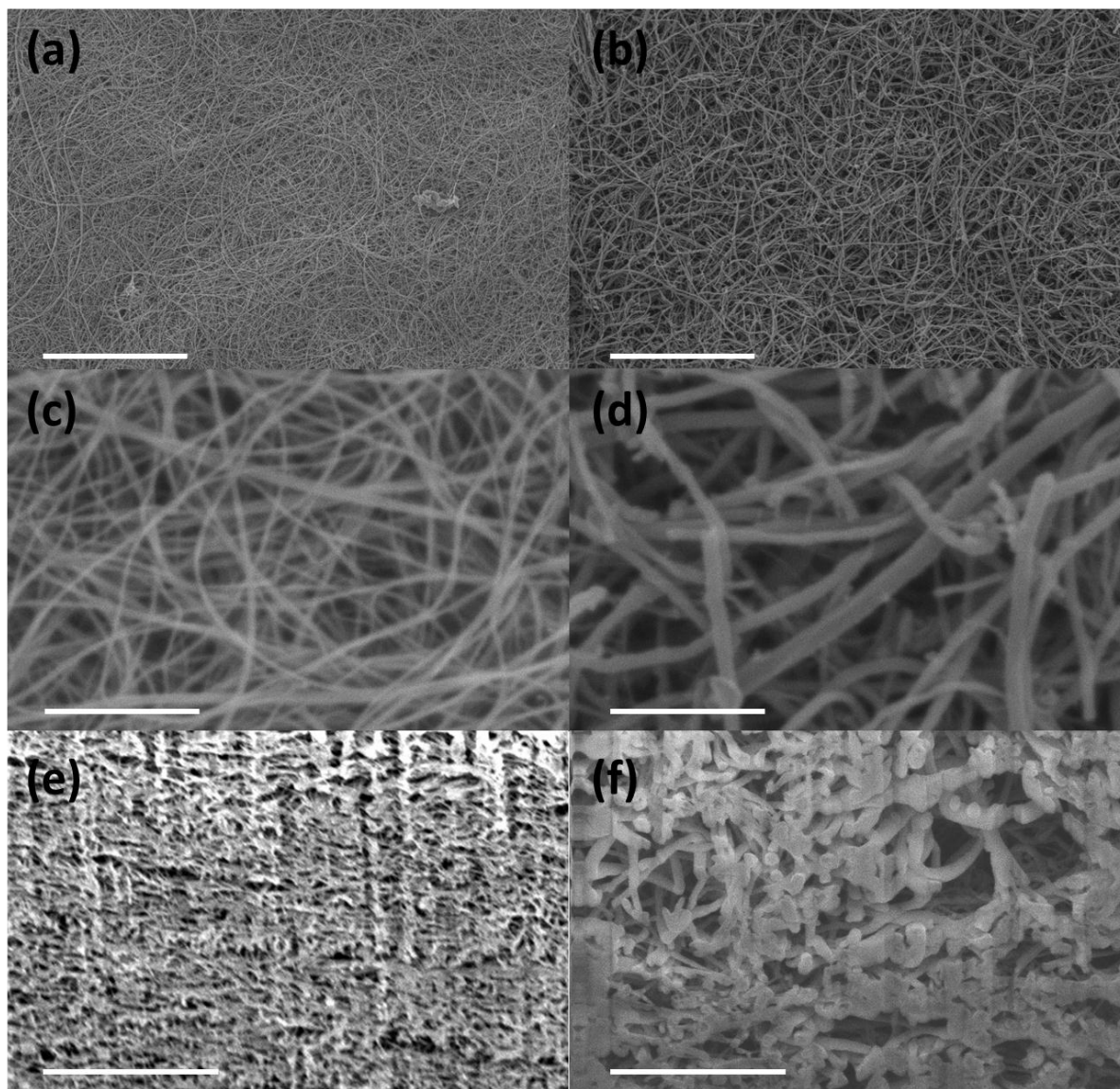


Figure S1 SEM of self-supporting BP without ZIF-8. Left and right columns respectively correspond to the fine and coarse CNTs with (a) and (b) at low magnification (scale bar 5 μm), (c) and (d) at high magnification (scale bar 500 nm) and (e) and (f) cross sections (scale bars at 2 μm)

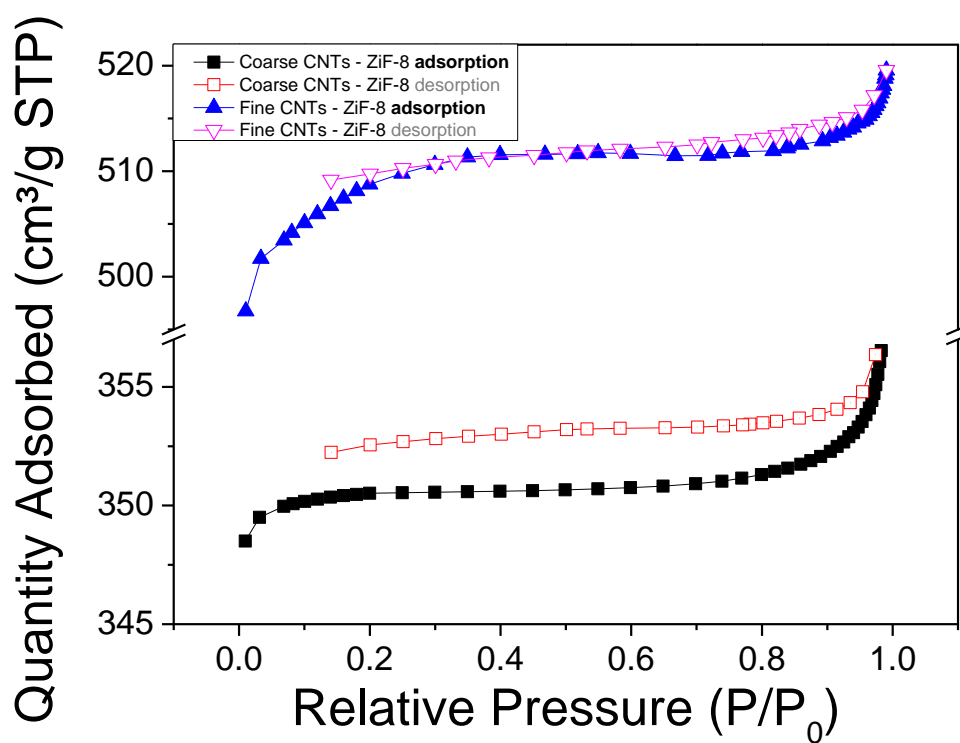


Figure S2 Representative isotherms for both ZIF-8 fine and coarse CNT composites in adsorption and desorption of N_2 from the BET experiment.

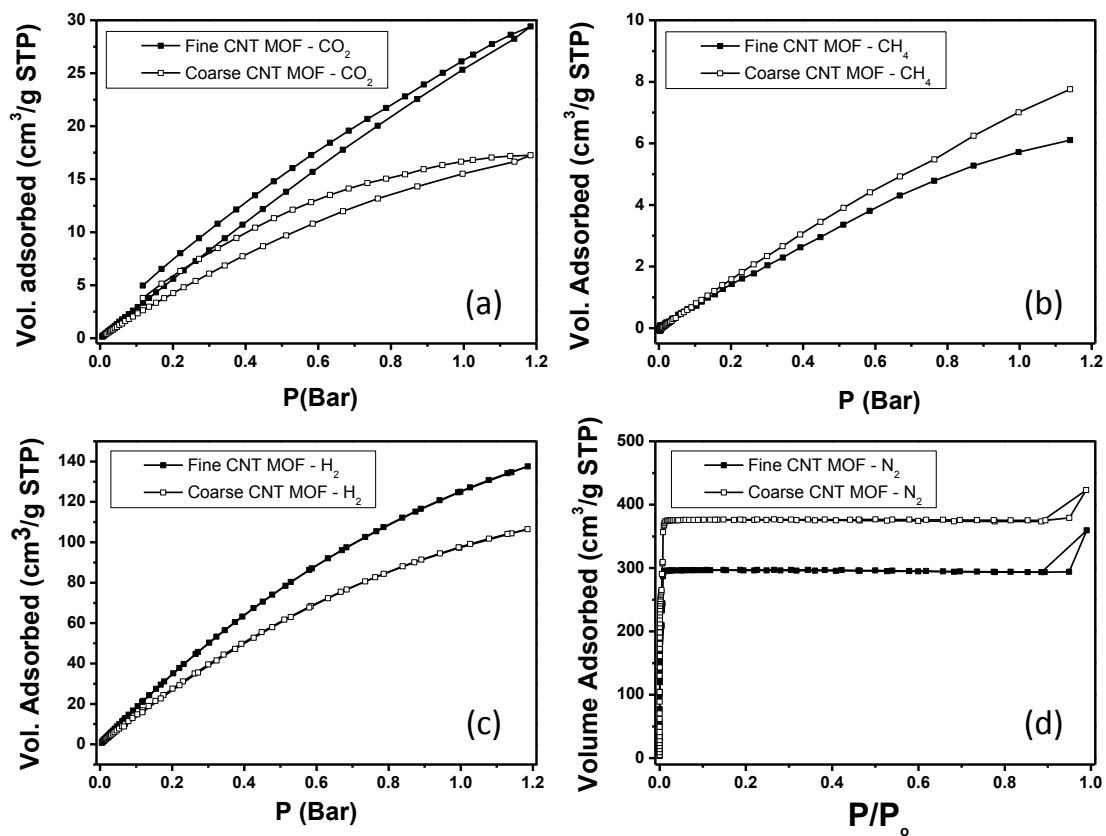


Figure S3 Adsorbed volumes for (a) CO₂ (277K), (B) CH₄ (277K), (c) H₂ (77K) and (d) N₂ (77K) under the conditions described in the experimental section

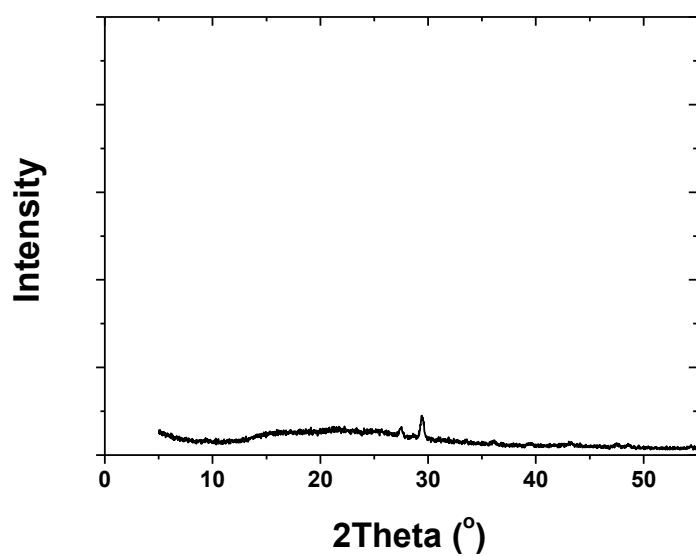


Figure S4 XRD pattern of the CNT BP without ZIF-8, scale is different than that presented in Figure 2 in order to resolve the broad diffraction peaks related to the CNTs

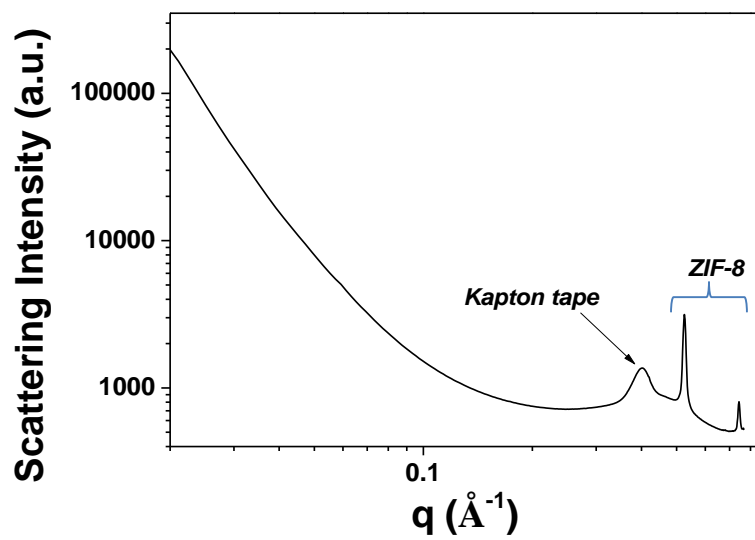


Figure S5 SAXS pattern of ZIF-8 powder sandwiched between two Kapton tape layers (camera length of 0.9 m; q window of [0.02; 0.85] Å⁻¹)

Table S1 Morphology of the BP support layers

| | | BP Support layer | |
|--------------|------|-------------------------|---------------------------|
| Property | Unit | Fine CNTs ²⁵ | Coarse CNTs ²⁵ |
| CNT diameter | nm | 10 (+/- 2) | 40 (+/- 7) |
| Porosity | % | 90 | 85 |
| Pore size | nm | 25 (+/-2) | 50 (+/- 3) |
| Thickness | μm | 10 (+/-2) | 25 (+/-2) |

Table S2 Properties of the gas tested from³⁵

| | Kinetic diameter | Molecular weight |
|-----------------|------------------|------------------|
| | Å | Da |
| He | 2.6 | 4 |
| CO ₂ | 3.3 | 44 |
| Ar | 3.4 | 39.44 |
| CH ₄ | 3.8 | 16.04 |
| N ₂ | 3.64 | 28 |
| Xe | 3.96 | 131.29 |