Electronic Supplementary Material (ESI) for RSC Advances.


# Supporting Information for

## Large refractive index changes in ZIF-8 thin films of optical quality

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Tab. S1: Details about the ellipsometry fit.

| Layer | Parameter | Value |
|---|---|---|
| Roughness layer | Layer type | Effective medium layer |
| | | Top layer: air (n=1, k=0) |
| | | Bottom layer: "ZIF-8 layer" |
| | Fraction of inclusion | 0.5 |
| | Thickness | free |
| ZIF-8 layer | Layer type | Cauchy-Layer |
| | N0 | free |
| | N1 | free |
| | N2 | 0 |
| | K0 | 0 |
| | K1 | 0 |
| | K2 | 0 |
| | Thickness | free |

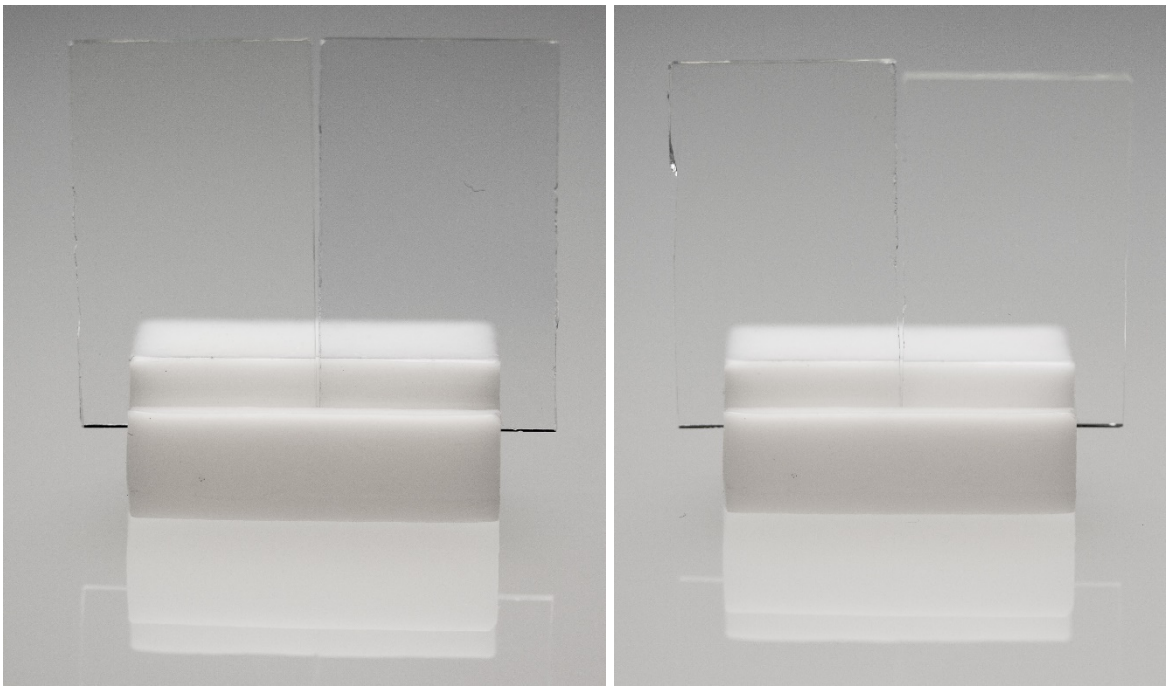

Fig. S1: Photographies of ZIF-8 thin films after 1, 2, 3 and 5 deposition cycles (from left to right).

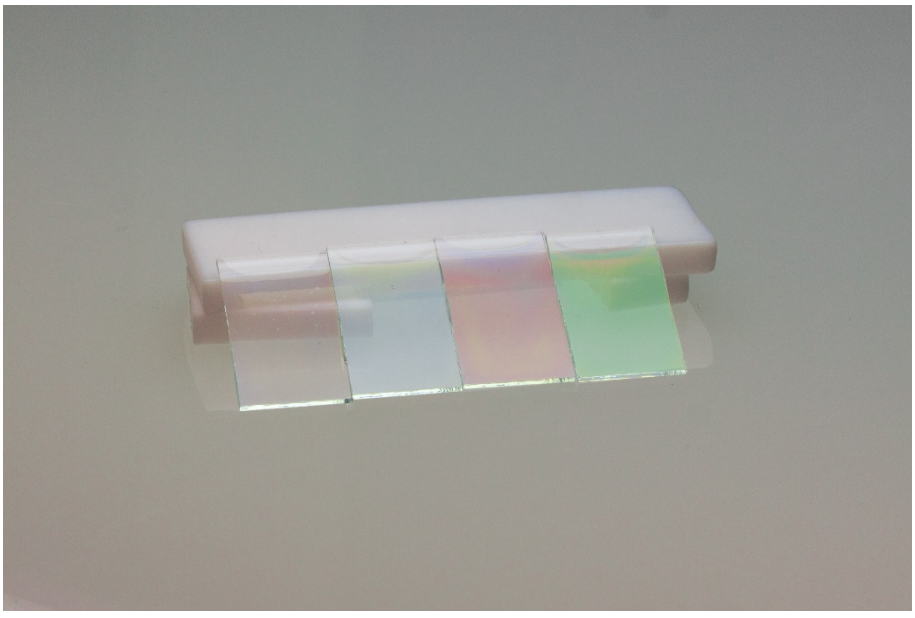

Fig. S2: Photographies of ZIF-8 thin films after 1, 2, 3 and 5 deposition cycles (from left to right) viewed at an oblique angle. Interference colors are visible which vary according to the different thicknesses of the films which lie in the wavelength range of visible light.

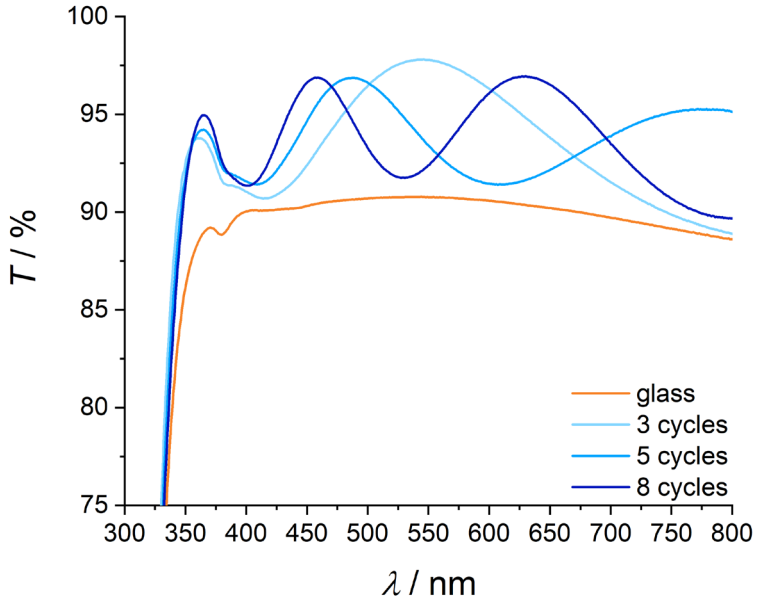


Fig. S3: UV-Vis transmission spectra of ZIF-8 thin films on glass compared to the transmission spectrum of glass. For the baseline of all spectra, air was used as reference.

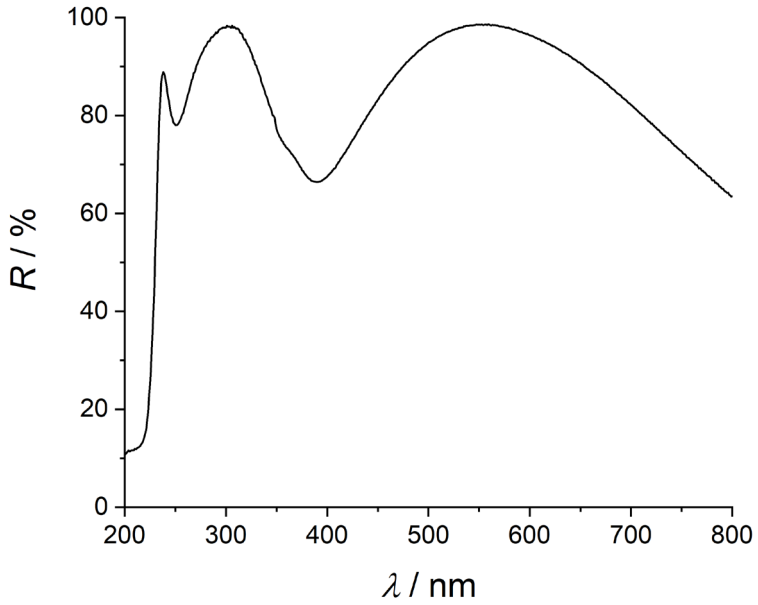


Fig. S4: Reflectance spectrum of a ZIF-8 film prepared with three deposition cycles on silicon. An uncoated silicon wafer was used as the background.

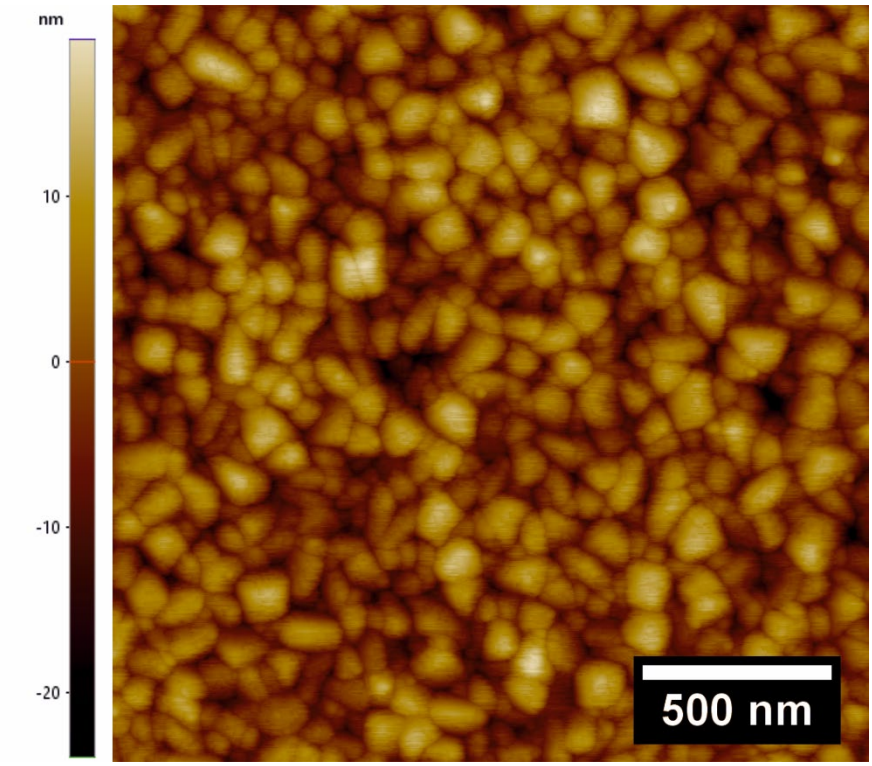


Fig. S5: Example of a topographic AFM image of a ZIF-8 thin film on silicon prepared with three deposition cycles.

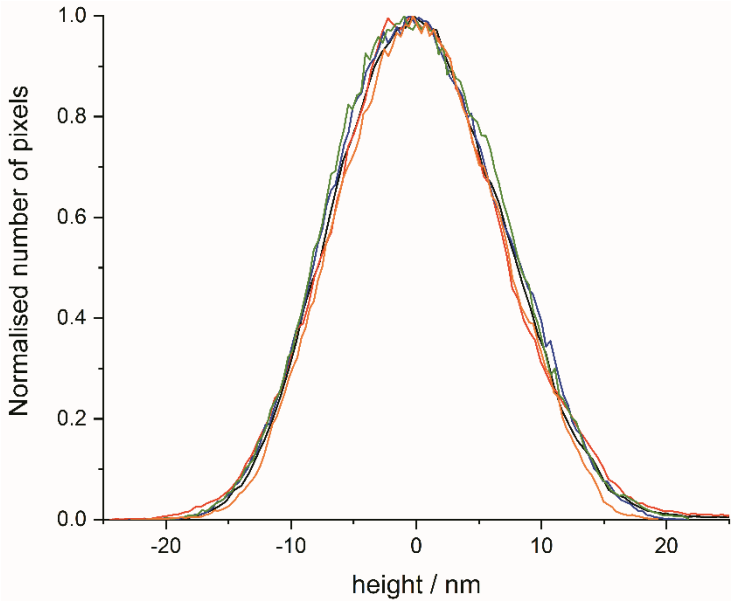


Fig. S6: Normalised histograms showing the difference of the pixel heights in five AFM measurements on ZIF-8-coated silicon wafers prepared with three deposition cycles.

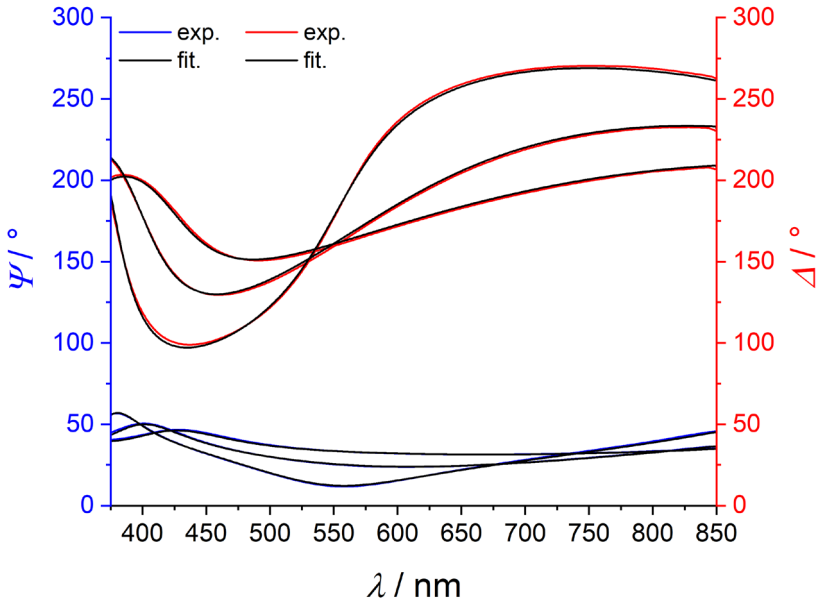


Fig. S7: Typical example of a fit to the results of an ellipsometry measurement for a ZIF-8 thin film, using a Cauchy model for fitting (see Tab. S1).

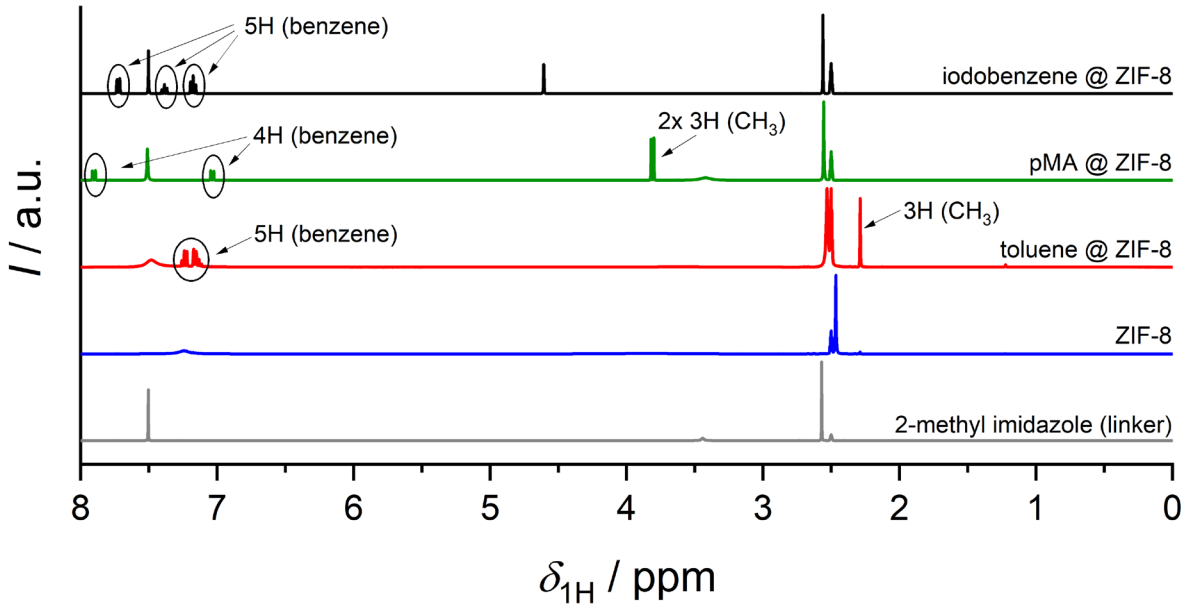


Fig. S8: $^{1}$H NMR spectra of digested ZIF-8 samples after loading with guest molecules. The spectra of the pure linker as well as of digested empty ZIF-8 are also given.

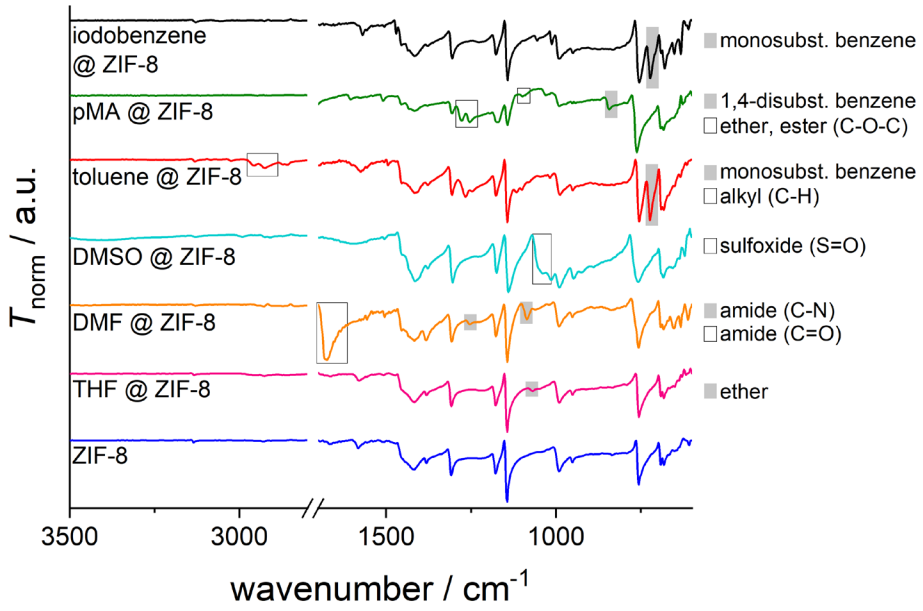


Fig. S9: IR spectra of loaded ZIF-8 thin films. The spectrum of a ZIF-8 film is also given.

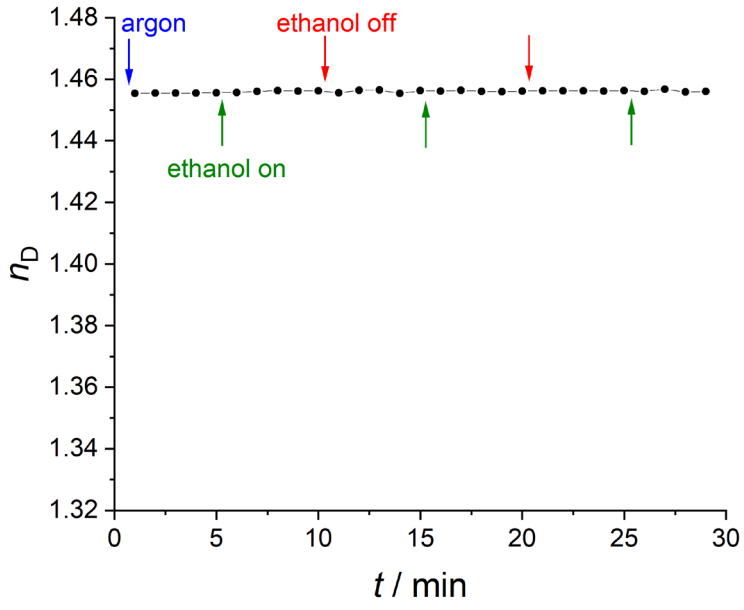


Fig. S10: Reference experiment for gas phase loading experiments, carried out on a silicon wafer with a ca. 100 nm silica coating.

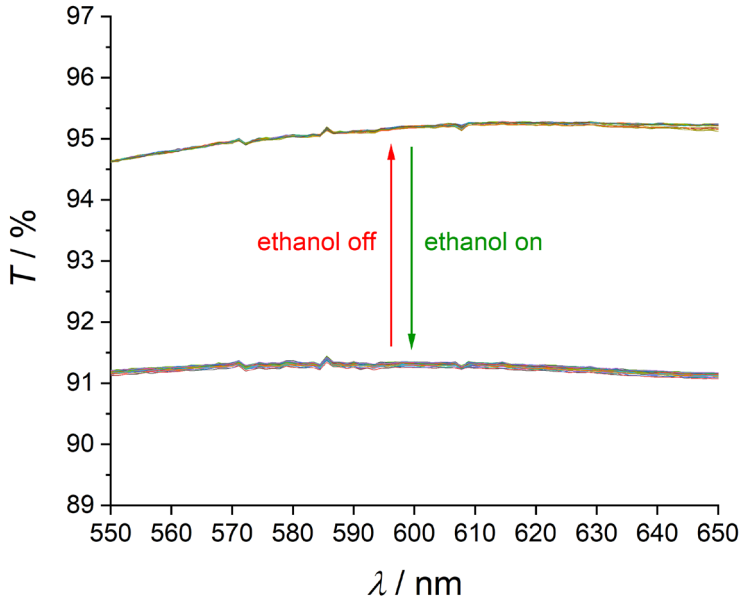


Fig. S11: Fast UV/Vis measurements on a ZIF-8 thin film on silicon measured in argon and ethanol atmosphere.

The measurement in Fig. S11 was performed with our UV/Vis spectrometer in a spectral range from 550 to 650 nm. We used a home-built measurement cell with input and output for gases and quartz glass windows that can be installed in our UV/Vis spectrometer. The spectra were collected in an automated loop that starts a new measurement every 13 seconds. This is the fastest setting that can be used for a loop using this spectrometer. These 13 seconds are divided in 5 seconds for the measurement and 8 seconds for the reset of the spectrometer. We used argon as the feed gas which either flowed directly to the sample chamber or was guided through liquid ethanol first (for ethanol-containing argon flows). We always performed eight measurements in each atmosphere in a row (~2 minutes). The gas flow was changed directly after the end of the eighth measurement (from argon to ethanol-containing argon or vice versa) in a certain atmosphere. In performing these experiments, we did not observe any delay in complete switching, i.e. no “intermediate spectra” are registered. Thus, we can state that the refractive index change obtained via the gas phase does not take longer than eight seconds.