SUPPORTING INFORMATION

Carbon Dioxide Binding in Supercooled Water Nanofilms on Nanominerals

Merve Yeşilbaş*,[1] Xiaowei Song[2], and Jean-François Boily*‡

1. Department of Chemistry, Umeå University, SE-901 87 Umeå, Sweden
2. IKEA of Sweden AB, SE-343 34 Älmhult, Sweden

*** tel.** +46-72 219 5760; **email.** merve.yesilbas@umu.se

*** tel.** +46-73 833 2678; **email.** jean-francois.boily@umu.se

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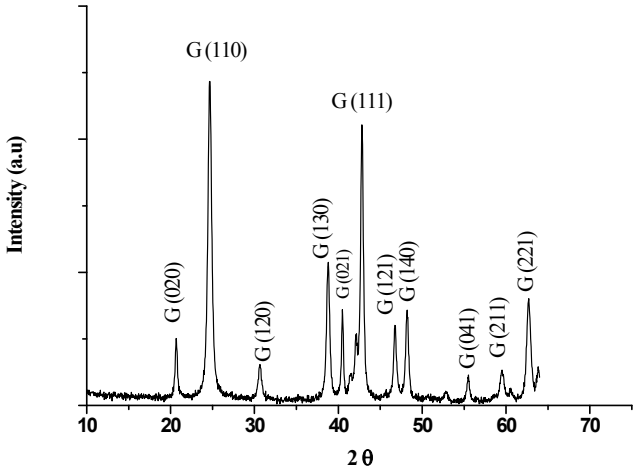

Figure S1 XRD pattern of the synthesized goethite

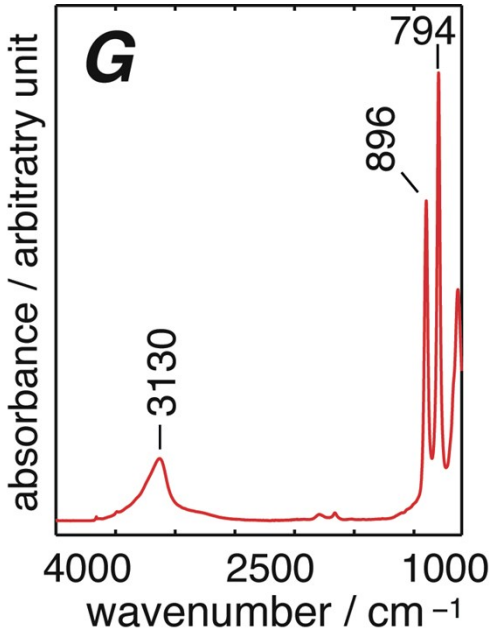

Fig. S2 ATR-FTIR spectrum of dry dialyzed goethite. No other phases can be detected.

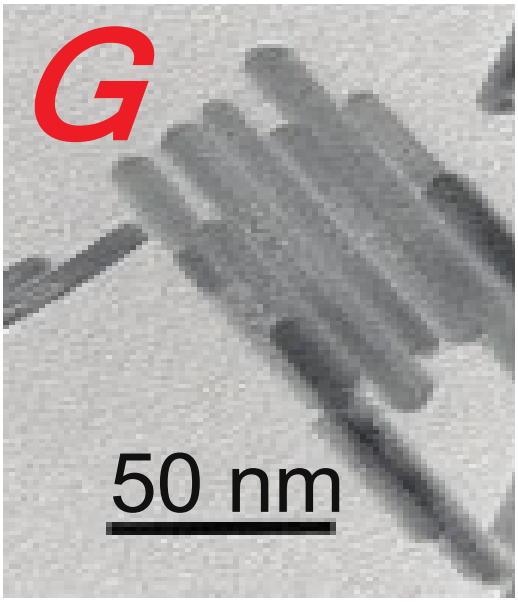

Fig. S3 Transmission electron microscope image of goethite (G) nanoparticles under study.

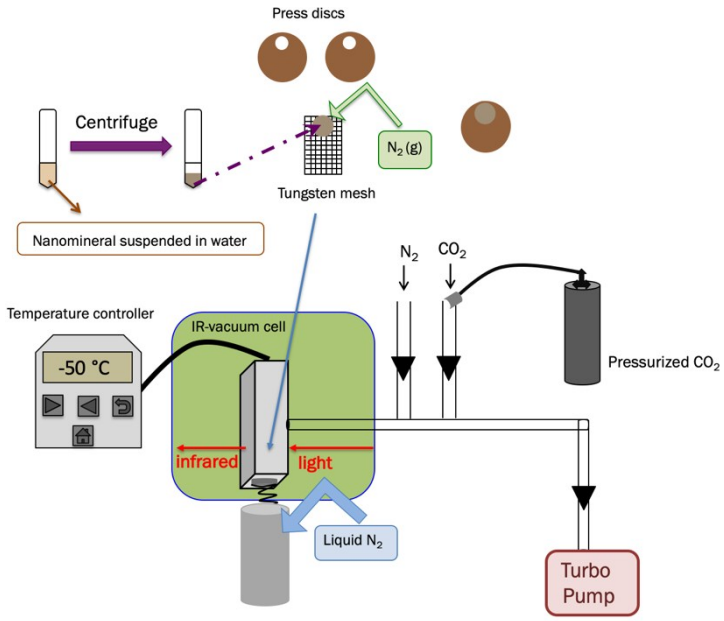

Fig. S4. Schematic representation of experimental used for CryoFTIR spectroscopy measurements of CO_2 binding on water nanofilms supported by nanominerals.

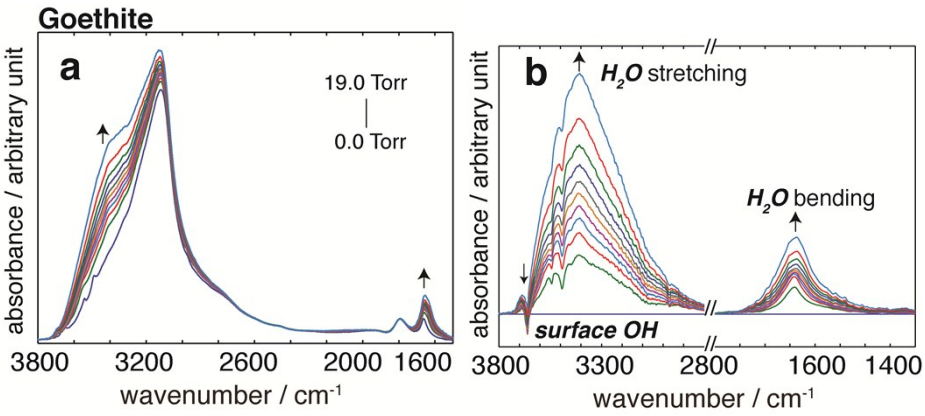

Fig. S5 ATR-FTIR spectra of dry dialyzed goethite exposed to water vapor in the 0-19.0 Torr (0-2.5 kPa) range at 25 °C, and in the absence of CO_2. (a) raw and (b) difference (relative to dry goethite) spectra showing increase in the O-H stretching (~3300 cm^{-1}) and water bending (~1630 cm^{-1}) bands of the water films. From the study of Song and Boily.[1]

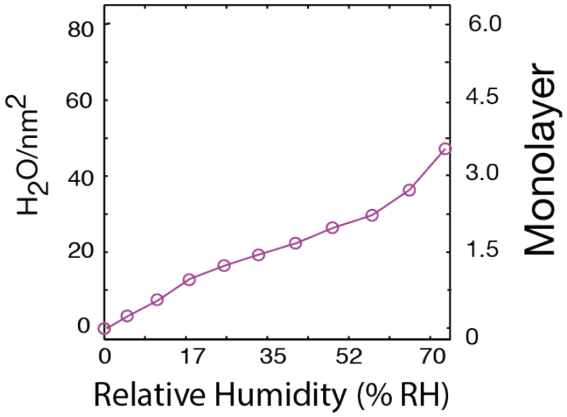

Fig. S6. Adsorption isotherm of water vapour on dialyzed goethite at 25 °C. From the study of Song and Boily.[2]

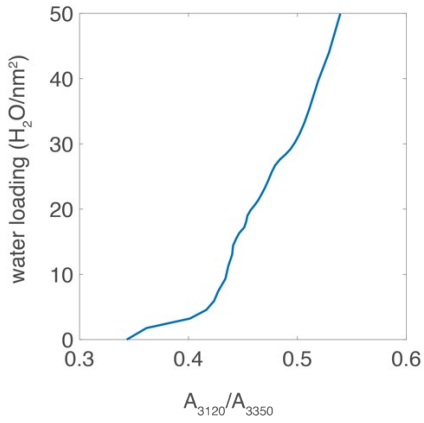

Fig. S7 Correlation between FTIR (Fig. S4a) and QCM (Fig. S5) data. This correlation was taken using the ratios of the intensities of the bulk OH stretch of goethite (3120 cm^{-1}) and of the water film (3350 cm^{-1}), using spectra as in Fig. S4, with absorbances offset to 0 at > 3800 cm^{-1} and the intensity at 3120 cm^{-1} normalized to unity. As this is an empirical correlation, estimates of water loadings are made by interperpolation.

References

1. Song, X.; Boily, J. F., Water vapor adsorption on goethite. *Environ. Sci. Technol.* **2013,** *47*, (13), 7171-7.
2. Song, X.; Boily, J. F., Water vapor diffusion into a nanostructured iron oxyhydroxide. *Inorg. Chem.* **2013,** *52*, (12), 7107-13.