Supplementary Information for

Template-free fabrication of single-crystalline calcite nanorings during crystal growth in water

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Supplementary Methods

Brunauer–Emmett–Teller specific surface areas (BET-SSAs) of the powder samples were measured via nitrogen adsorption[1] at 77 K using a Macsorb HM Model-1208 system (Mountech Co., Ltd., Japan). The samples were initially dried at 105°C for 1 h under vacuum.

Powder X-ray diffraction (XRD) patterns were recorded using a Multi Flex diffractometer (Rigaku Co., Ltd., Japan) to investigate the crystalline phases and average crystallite sizes. XRD patterns were collected in the range of $2\theta = 20°$ to 60° using the Cu K_α radiation (wavelength: 0.15406 nm) operating at 40 kV and 40 mA. XRD data analysis was conducted using the PDXL software (Rigaku Co., Ltd., Japan). The average crystallite size was derived from the peak broadening of the calcite {104} diffraction peak at ~29.5° via the Scherrer equation (Scherrer constant: 0.94).[2]

Transmission electron microscopy (TEM) observation was performed using a JEM-2100HR instrument (JEOL Co., Ltd., Japan) at 200 kV equipped with a LaB_6 electron gun. Specimens for TEM observation were prepared by dispersing the obtained powders into isopropyl alcohol, dropping the suspension on carbon/collodion-coated copper grids, removing the excess liquid, and vacuum-drying.

Field emission-scanning electron microscopy (FE-SEM) observation was performed using a JSM-6330F instrument (JEOL Co., Ltd., Japan) at 15.0 kV. Specimens for FE-SEM observation were prepared by mounting the TEM samples on carbon tape and sputter-coating with platinum using a Fine Coater JFC-1200 (JEOL Co., Ltd., Japan) to impart electrical conductivity.

References

1. S. Brunauer, P. H. Emmett, E. Teller, *J. Am. Chem. Soc.*, 1938, **60**, 309; R. S. Mikhail, S. Brunauer, *J. Colloid Interface Sci.*, 1975, **52**, 572.

2. P. Scherrer, *Nachr. Ges. Wiss. Göttingen*, 1918, **2**, 96.