

Supporting information

From Silicon to Silica: A Green Chemistry Approach for Hollow Sphere Nanoparticle Formation

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Powder X-ray diffraction (XRD)

Powder X-ray diffraction analysis was carried out to determine the degree of crystallinity and possible phase content of the dry reference cCVD Si nanoparticles. A small nanoparticle sample was dispersed in ethanol and transferred to a Si zero-diffraction plate that was dried to form a thin layer before measurement. The analysis was carried out using Cu K α radiation from a Bruker D2 Phaser diffractometer with a theta/theta goniometer and a LynxEye XE-T 1D detector. The angle (2θ) from 10 to 80° was analyzed at a step size of 0.2°. Crystalline Si powder was measured as a control sample.

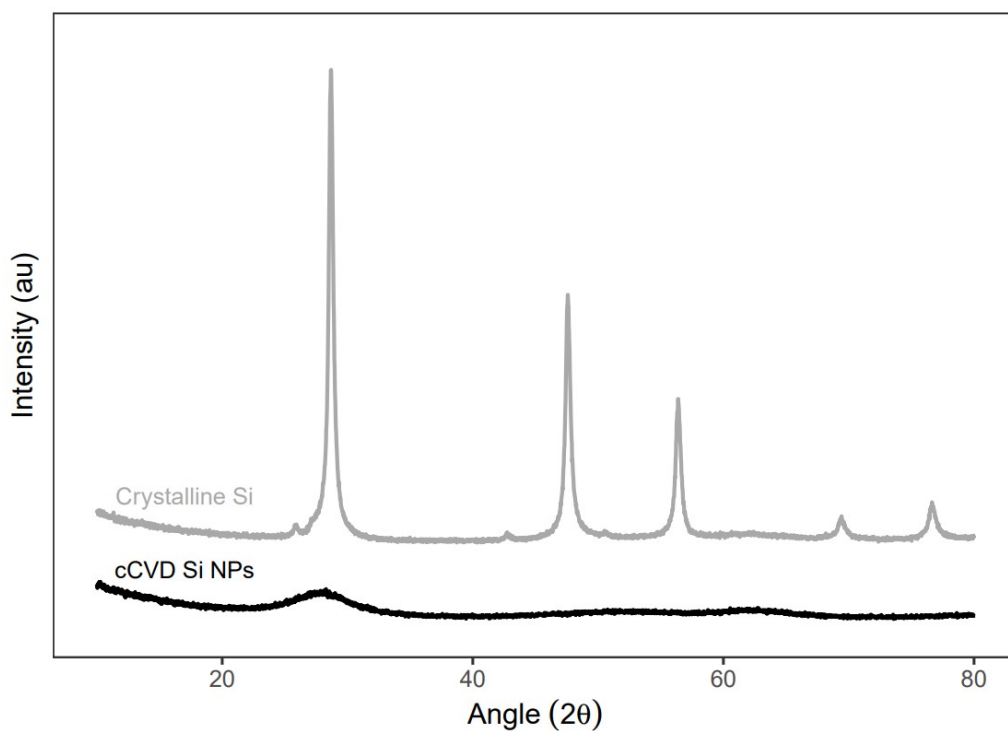


Figure S1. XRD pattern of reference cCVD Si nanoparticles shows the material to be amorphous. For comparison, the powder diffractogram of the crystalline Si sample is included.

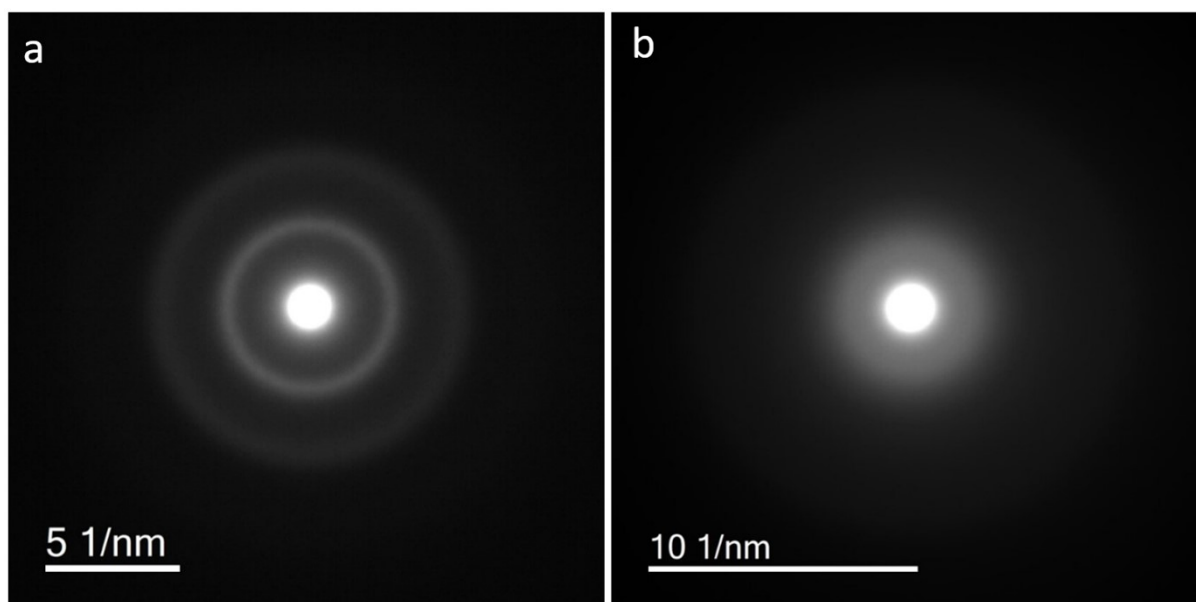


Figure S2. Selected area electron diffraction (SAED) pattern of cCVD Si nanoparticles before (a) and after (b) base treatment at pH 9.0 for 300 min, showing the materials to be amorphous.

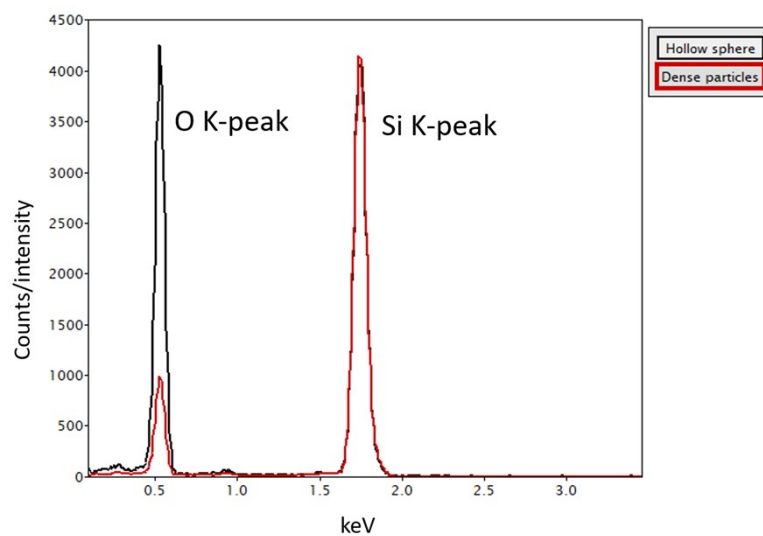


Figure S3. Electron energy loss spectroscopy (EELS) elemental analysis of dense nanoparticles and HSS seen in the pH 8.0 treated sample (Figure 4, bottom panel). Average elemental distribution from EELS analysis plotted as energy of excited photons (keV) versus counts/intensity.

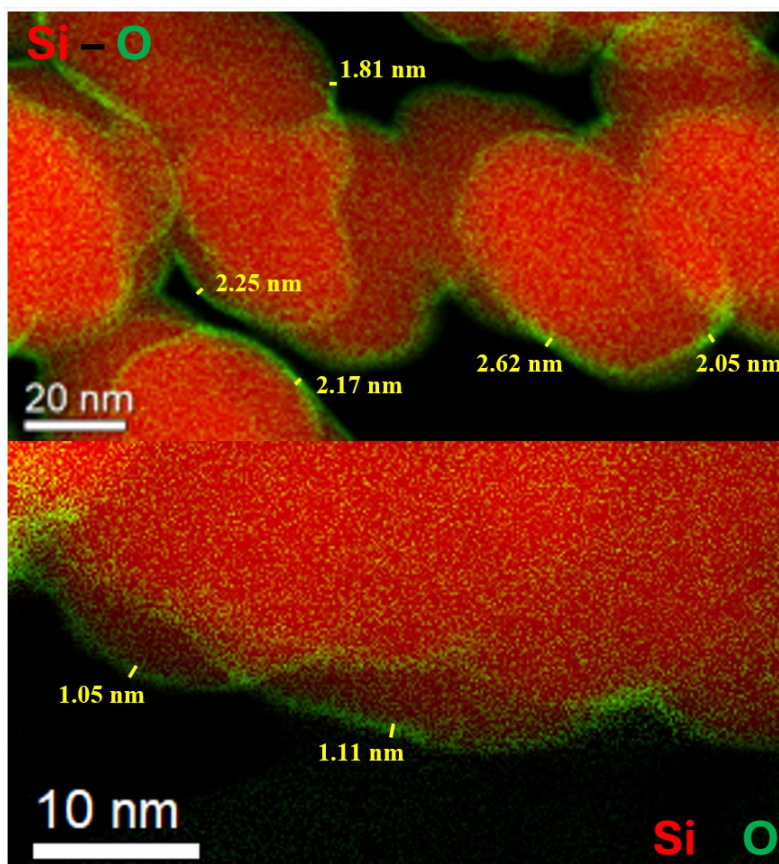


Figure S4. EELS mapping overlay of reference nanoparticles showing the distribution of Si (red) and O (green), the only elements detected in the sample. The thickness of the native oxide is indicated in several places (yellow).

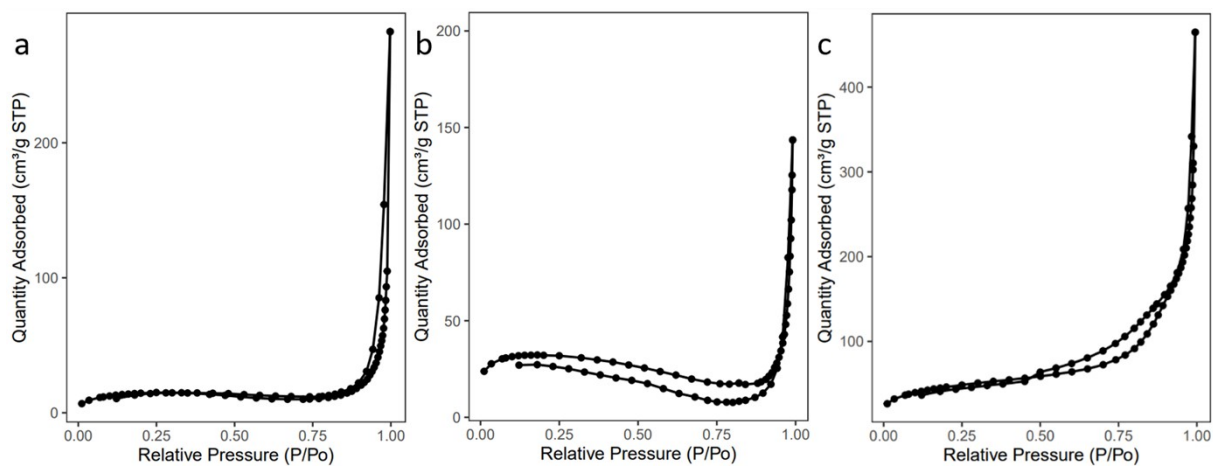


Figure S5. BET isotherms of reference Si nanoparticles before base treatment (a) and after treatment in pH 7.4 (b) and in pH 8.0 (c). These samples showed that base treatment increased the surface area from 56 (a) to 127 (b) and 162 (c) m²/g.