

Complete Synthesis of Germanium Nanocrystal Encrusted Carbon Colloids in Supercritical CO₂ and their Superhydrophobic Properties

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Supporting Information

Experimental Setup of Apparatus:

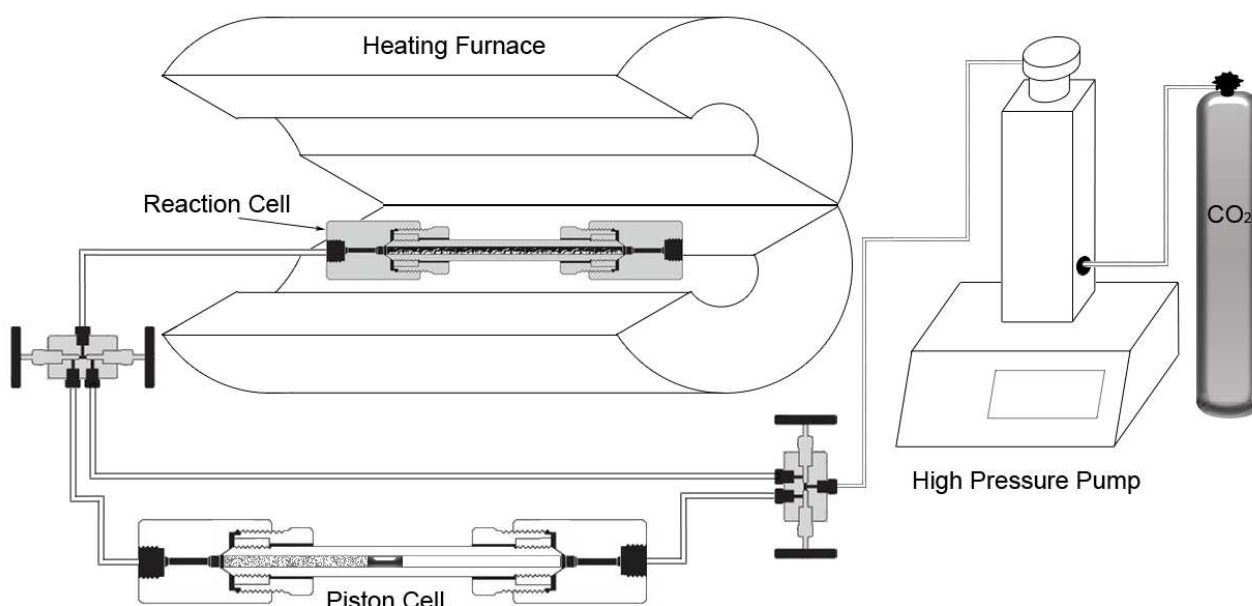


Figure S1. A schematic outlining the set-up used for supercritical fluid synthesis of materials is shown. A high pressure pump is directly connected to either stainless steel or titanium reaction vessels, which are then placed within a three zone furnace.

SEM Analysis:

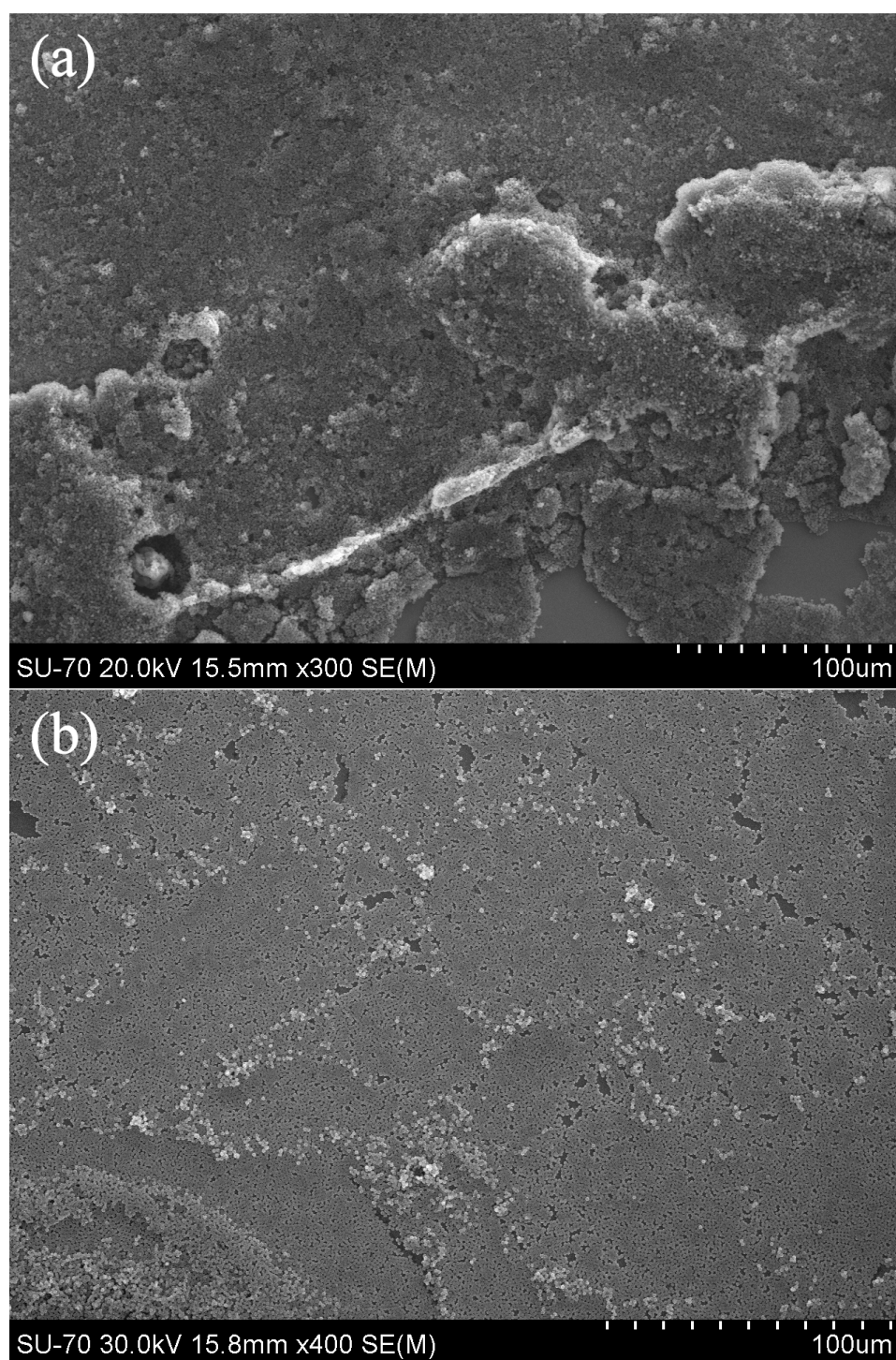


Figure S2. By varying the ratio of solvent volume to carbon sphere concentration, drop cast assemblies could be altered to form either single or multi-layers of colloidal carbon spheres.

Gas Absorption Analysis:

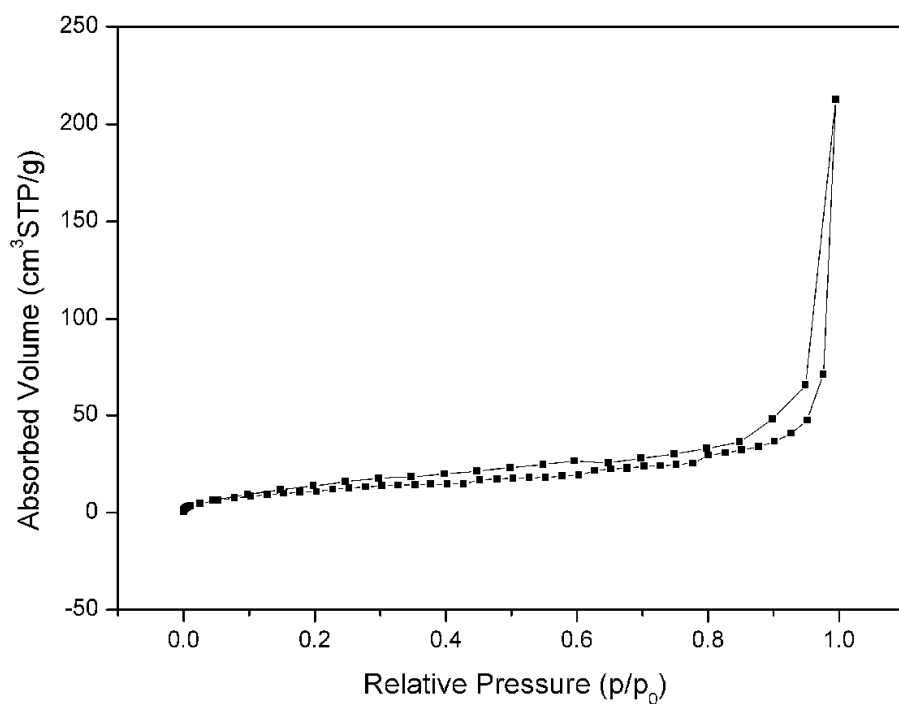


Figure S3. N₂ adsorption-desorption isotherms collected from samples of colloidal carbon spheres exhibited low porosity. Analysis of the microporous surface of the spheres gave multi-BET and DFT values of 46.120 m²/g and 0.078 cc/g respectively.

HRSEM and EDS Analysis:

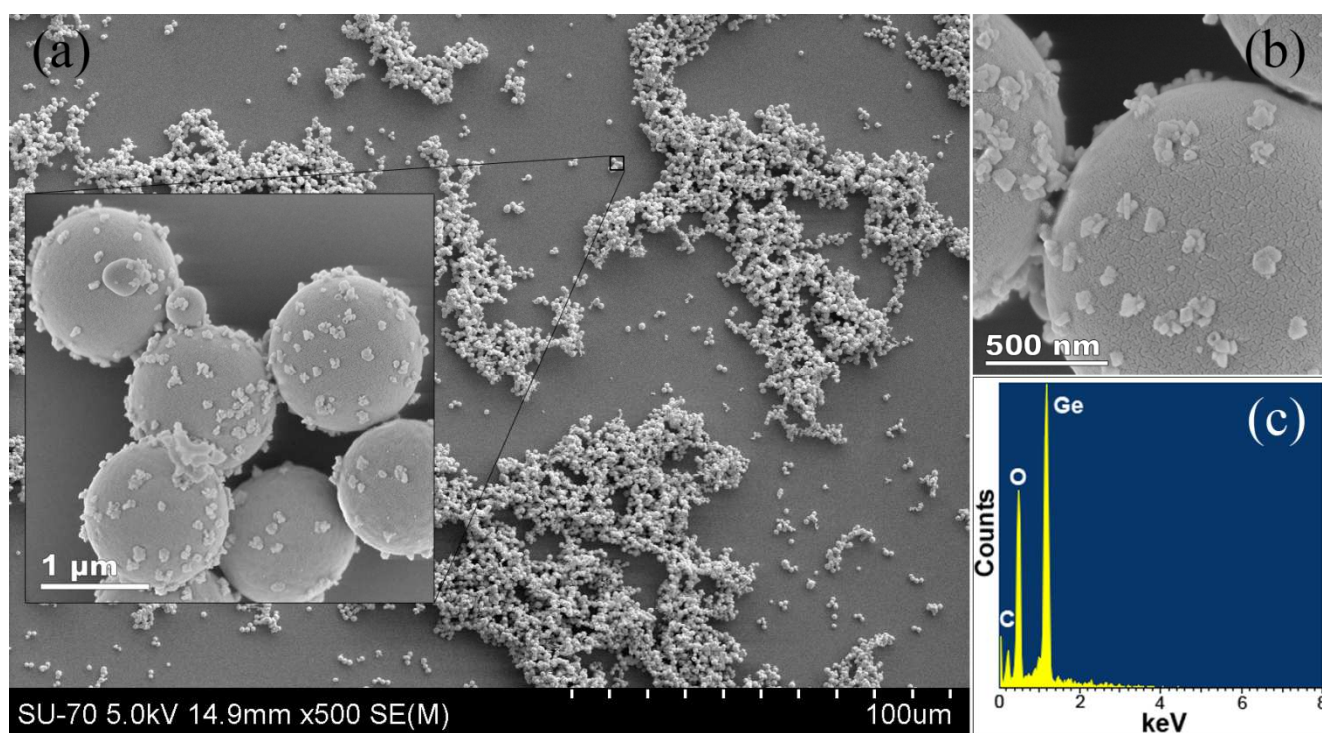


Figure S4. SEM image (a) of a bundle of Ge modified carbon spheres deposited onto a silicon wafer, with a high magnification image inset. Nanocrystal dimensions were found to vary in size from 10-40 nm (b). EDS spectrum (c), collected from a dense area of nanocrystals, confirms their predominant Ge composition.

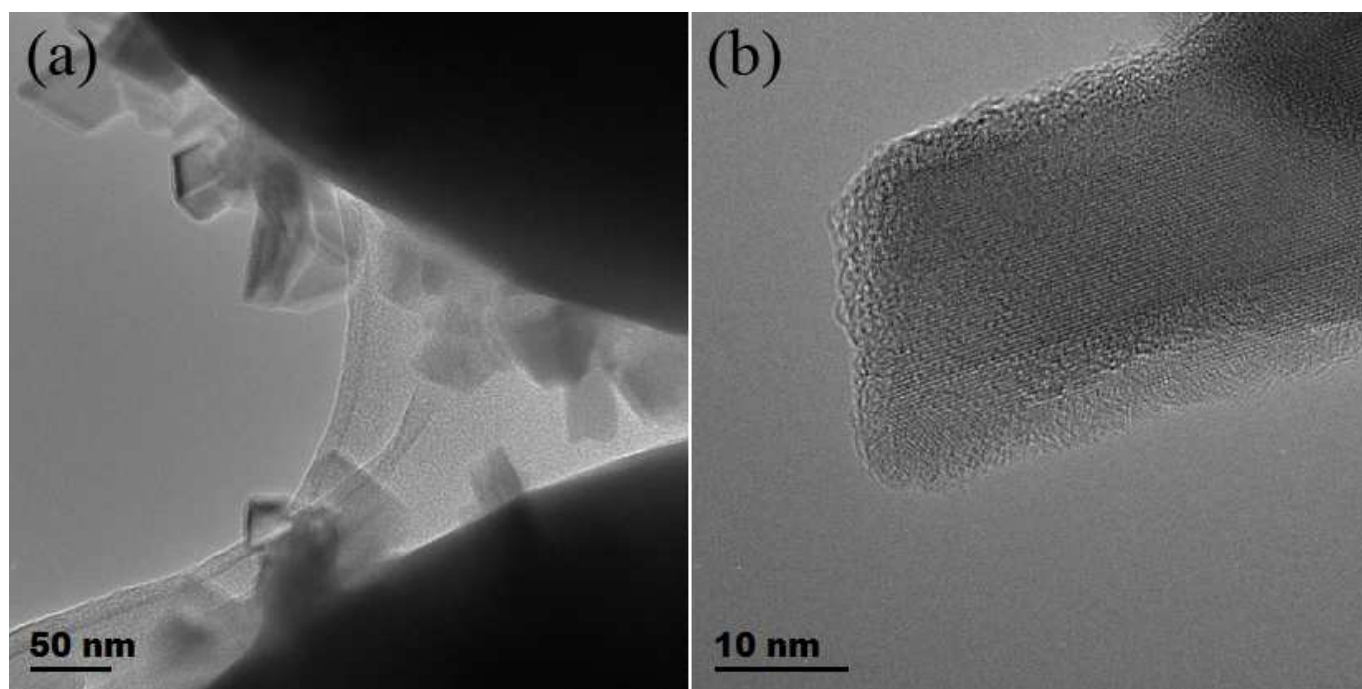


Figure S5. TEM image (a) gives an example of the different morphologies of Ge nanocrystals nucleated from the surface of the carbon spheres. The high resolution image (b) shows a rod shaped nanocrystal with visible lattice fringing and native oxide.

XPS Analysis:

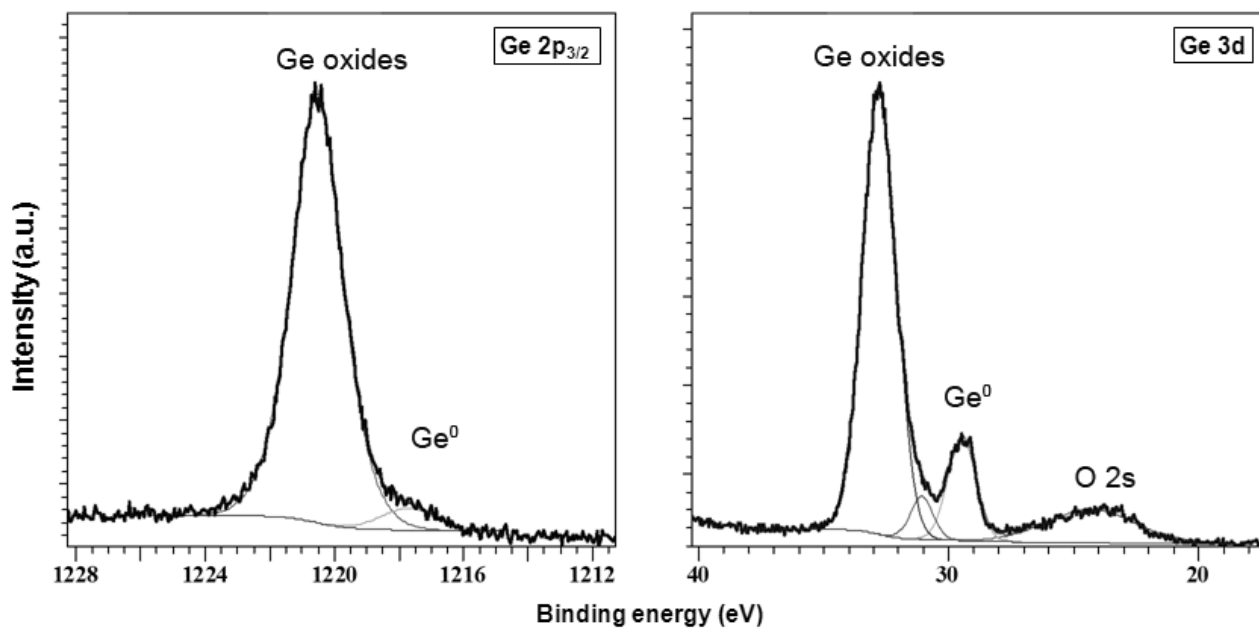


Figure S6. XPS spectra obtained from samples of as synthesized carbon spheres with low temperature Ge modification (550°C). The high resolution scans shown here are taken from the spectral regions of Ge 3d and Ge 2p_{3/2}.