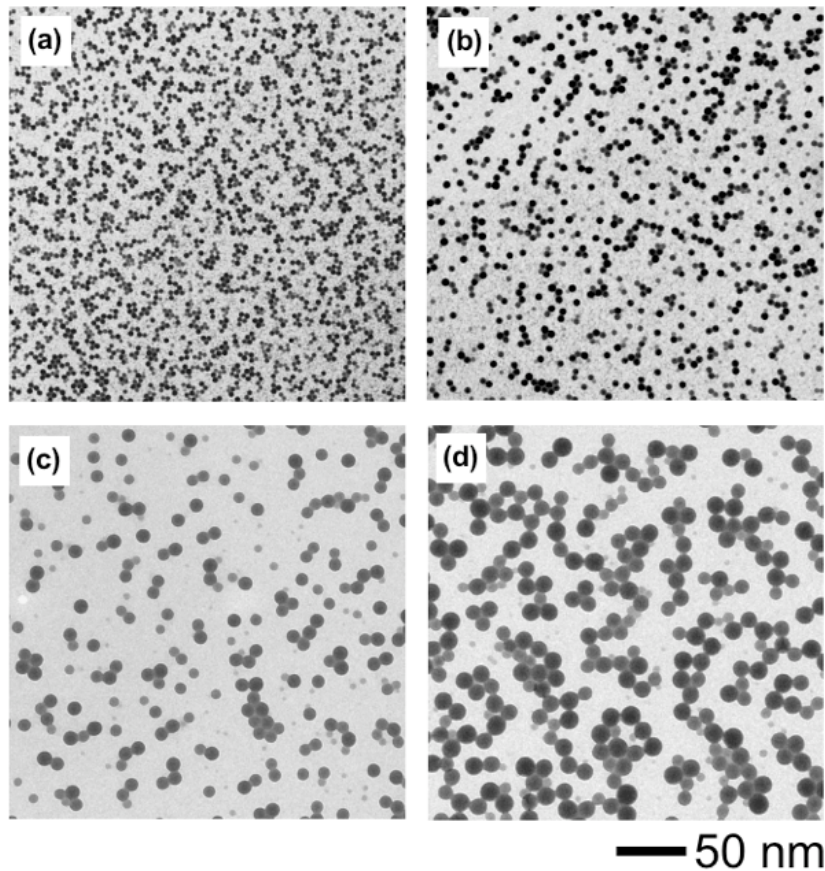


PREPARATION OF FREESTANDING GERMANIUM AND SILICON NANOCRYSTALS BY ULTRASONIC AEROSOL PYROLYSIS

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A synthetic route adaptable for the continuous, large-scale production of germanium and silicon nanocrystals for emerging electronic and optoelectronic applications such as third generation solar conversion technologies is presented. Using an ultrasonic aerosol pyrolysis approach, relatively monodisperse Ge and Si nanocrystals with average sizes below 20 nm are synthesized, and the mean crystal diameter is precisely tuned by varying the Ge or Si precursor concentration. The nanocrystals result from the thermal decomposition of an ultrasonically generated aerosol containing the Ge or Si precursor, followed by their gradual cooling and subsequent capture in organic solvent. Nanocrystal surface encapsulation and functionalization will be described, as well as initial optoelectronic measurements.



Transmission electron microscopy images of Ge nanocrystals synthesized by ultrasonic aerosol pyrolysis. The nanocrystals shown above have average diameters of (a) 3, (b) 4, (c) 7, and (d) 10 nanometers.