

Abstract Submitted
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Synthesis of group IV quantum confined nanocrystals using a scalable atmospheric pressure plasma reactor SADEGH ASKARI, PAUL MGUIRE, DAVIDE MARIOTTI, Nanotechnology & Integrated Bio-Engineering Centre (NIBEC), University of Ulster, BT37 0QB, UK, PLASMA SCIENCE AND NANOSCALE ENGINEERING GROUP TEAM — Group IV semiconductor nanocrystals (NCs) have acquired much interest for a wide range of applications including photovoltaic cells and light emitting devices. However synthesis of covalently bonded semiconductors of group IV nanoparticles with crystalline structure remains challenging due to the higher crystallization temperatures compared to other semiconductors such as group II-VI materials. We present our results on the synthesis of Si and SiC NCs in a scalable atmospheric-pressure plasma reactor. Liquid and gas precursors such as tetramethylsilane and silane have been used, and nanoparticles can be collected directly in liquids or on substrates to form films of NCs. Si and SiC NCs have been characterized by transmission electron microscopy, x-ray photoelectron spectroscopy and also by ultraviolet-visible absorption and photoluminescence measurements. The reactor configuration has been designed to improve the control of important parameters such as NCs residence time and throughput so that future developments can easily lead to scalable configurations for industrial-scale nanoparticle manufacturing without varying the plasma conditions.

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