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The physics and applications of nanomaterials produced with nonthermal plasmas¹

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Nonthermal plasmas provide an intriguing environment for the synthesis of nanomaterials. Not only does the unipolar negative charging of nanoparticles in plasmas yield significantly more monodisperse particle size distributions than other gas phase processes; the selective heating of small particulates in plasmas also enables producing high quality nanocrystals of high melting point materials. Nonthermal plasma hence prove to be ideal media for the synthesis of nanocrystals of covalently bonded semiconductors of the group IV and group III-V materials systems. This talk will discuss the unique physical principles of nanoparticle synthesis in plasmas. The presentation will also give examples of the applications of such plasma-produced nanomaterials to photovoltaic and light-emitting devices. The presenter hopes to make the case that nonthermal plasmas can fill a unique niche in the synthesis of nanomaterials that may prove of significant nonthermal value for applications in materials engineering, printed electronics, and renewable energy technology.

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