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Nanoparticles Functionalized with Organic Molecules

IP Status: Issued US Patent; **Application #:** 13/331,168

Passivation Layer Formed from Silicon Nanocrystals

A novel gas phase method and apparatus effectively grafts organic molecules onto silicon nanocrystals to form a passivation layer. The process produces grafted Group IV nanoparticles quickly, at room temperature and with minimal particle aggregation and diffusional losses. The plasma-treated particles are readily soluble in various nonpolar solvents.

Nanoparticle Synthesis

In the first step of the process, Group IV nanoparticles are synthesized in a chamber carrying the nanoparticles in a gas phase. An inlet to the chamber provides organic molecules, thus forming a mixture of nanoparticles and organic molecules (e.g. hexane, pentene). In the second step, the gas flow drags the silicon nanocrystals into the second reactor where they are immersed in plasma, which breaks down and/or activates the organic molecules and bonds them to the nanoparticles. After this surface functionalization, the silicon crystals are ultimately collected in the form of a powder.

BENEFITS AND FEATURES OF NANOPARTICLES FUNCTIONALIZED WITH ORGANIC MOLECULES:

- Fast synthesis
- Room temperature reaction
- Minimal particle aggregation and diffusional losses
- Particles are readily soluble in different nonpolar solvents

Phase of Development Proof of concept

Technology ID
z07107

Category
Engineering & Physical Sciences/Materials
Engineering & Physical Sciences/Nanotechnology
Engineering & Physical Sciences/Semiconductor

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