THE CORETEC GROUP

Quantum Dots Application

Coretec Cyclohexasilane™

6x The Silicon For Superior Performance

Quantum dots take advantage of nanoparticle sized materials in order to emit light of very specific wavelengths. Silicon quantum dots, in particular are non-toxic, can be made in a variety of colors with quantum yields of up to 85%. Silicon quantum dots created from cyclohexasilane (CHS) can be used in applications including solid state lighting, drug delivery, high-definition displays, vertical agriculture, cannabis farms, and quantum computing.

Features & Benefits

High Atom Economy

Higher processing yields contribute to lower device costs

Ease of Manufacture

Wide variety of processing conditions can be employed: solution-based, depositions, and UV-mediated

Long Shelf Life

Two year shelf life when stored at room temperature

Liquid Transport and Storage

Lower storage and transportation costs compared to gas

The Challenge

The quantum dot market is currently dominated by traditional semiconductor III-V and II-VI processing, including InP and CdSe. The full potential of silicon quantum dots has yet to be realized due to non-ideal processing conditions including extreme deposition temperatures and non-ideal molar conversion rates.

The Possibility

Coretec Cyclohexasilane (CHS) is a higher order silane (Si_6H_{12} vs SiH_4) and a liquid at room temperature. Building upon institutional knowledge of silicon chemistry and manufacturing methods from the semiconductor industry, silicon nanoparticles made from CHS can be created as direct band gap materials that offer the potential for new applications in optoelectronics and photonics in a way that bulk silicon cannot. Additionally, being a liquid silicon precursor allows the creation of quantum dots utilizing controlled solution chemistry. This tuning of the reaction conditions, resulting in quantum dots with much tighter size distribution, at temperatures that contribute to more efficient processing costs. Additionally, the efficient conversion of CHS to silicon quantum dots and the ability to modify resulting surfaces easily for colloidal dispersion, CHS offers an attractive option for their manufacture.

Contact Us: The Coretec Group, Inc. • thecoretecgroup.com • (866) 916-0833 • info@thecoretecgroup.com
600 South Wagner, Ann Arbor, MI 48103

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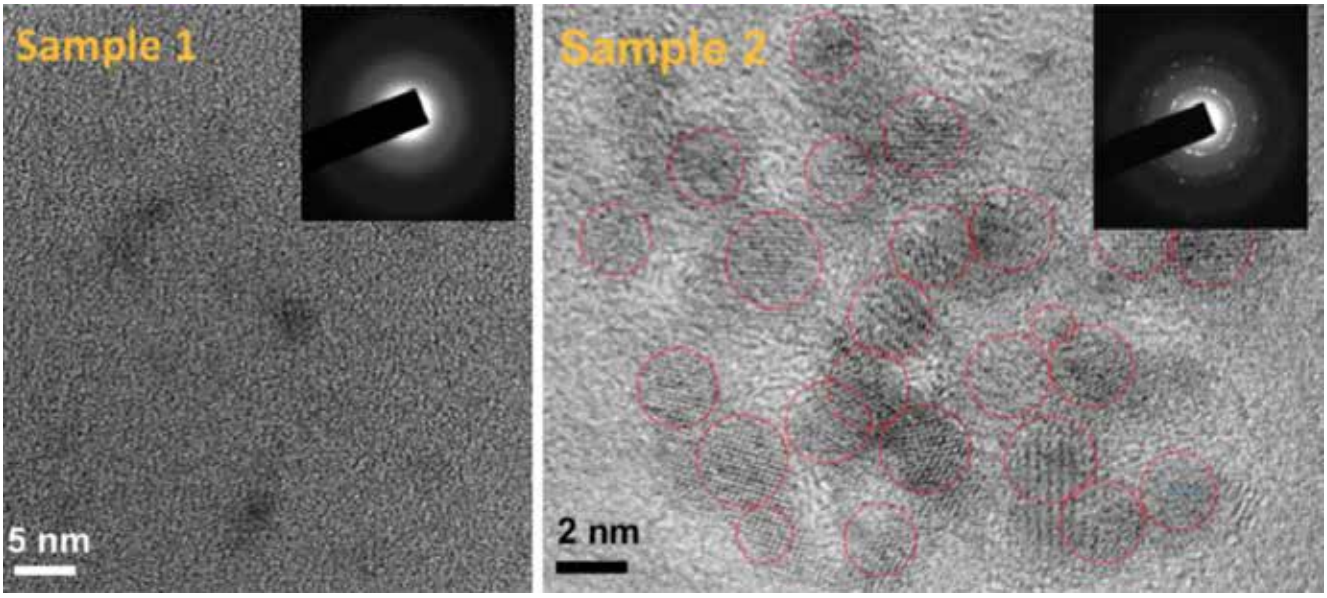
What Does This Mean?

Liquid silanes offer many advantages over silane gas most notably safety, improved scalability, and yield. CHS has successfully been used to create both amorphous and crystalline quantum dots as shown in the TEM images below allowing the end user to readily tailor the resulting quantum dots to the desired specification and application.



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