Solar Application

Coretec® HexaSilane™

6x the silicon for superior performance.

Coretec HexaSilane delivers six times the silicon in one molecule, making it an excellent silicon source for solar applications.

Its liquid state provides the distinct advantage of being paintable directly onto the surface of common building materials, creating possibilities for solar cell integration in architectural design.

Feature	Benefit
• Liquid processing	> Paintable onto a broad range of substrates
• Novel product forms	> Quantum dots and nanowires to increase efficiency or produce traditional silicon films in current process equipment
• Long shelf life	> Two-year shelf life when stored at low temperature
• Liquid storage & transport	> Lower storage and transport costs compared to gas
• Non-explosive	> Improved safety, handing costs and processing

The Challenge

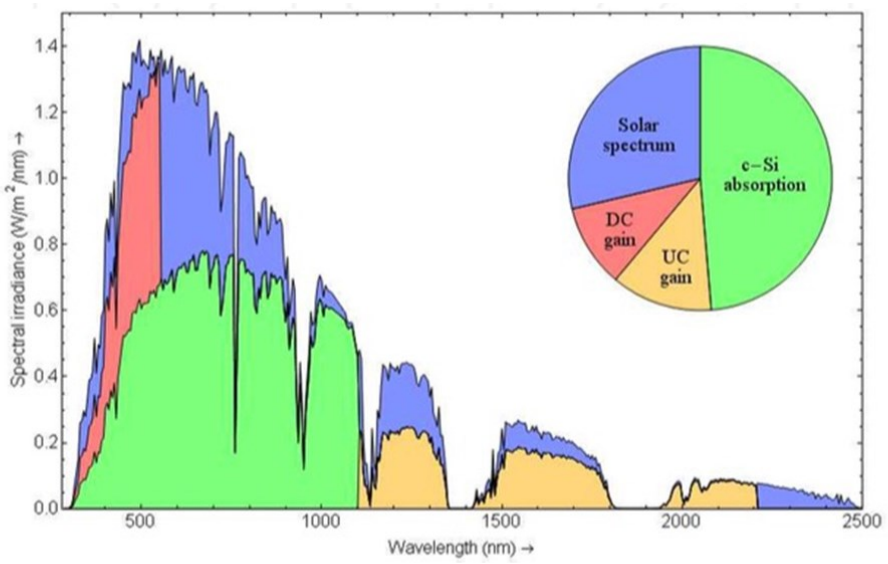
Photovoltaic solar cells are a green energy source that allow for cleaner and more sustainable methods of energy production. However, market adoption is dependent on finding ways to improve integration with building designs and increase the efficiency of converting solar light into electricity.

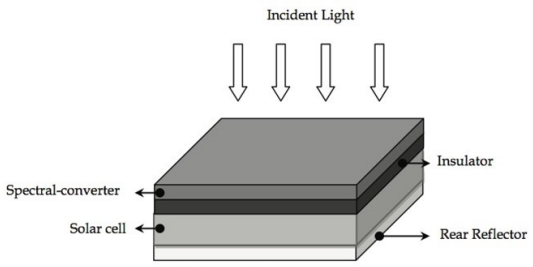
The Possibility

Coretec HexaSilane's unique liquid state makes it possible to paint high efficiency solar cells onto building material surfaces. Non-toxic silicon quantum dots have the potential to be distributed on the top of solar cells, enabling efficient collection of available solar energy. This enhanced efficiency would contribute to a closer parity of solar and traditional grid energy costs, encouraging further market adoption of solar technology. The same benefits are expected with artificial, indoor lighting.

2017 May

Energy loss in crystalline silicon photovoltaic that can be captured by *HexaSilane* derived silicon quantum dots





Potential gain when using a down- and upconversion coating for silicon solar cell. Green reflects energy conversion of the absorbed part of the solar spectrum for a crystalline silicon solar cell. Red reflects the extra energy conversion when using a down convertor. Yellow reflects the extra energy conversion when using an upconvertor. Spectral conversion occurs when light is aborbed by silicon QDs at one wavelength and remitted at a wavelength that can be absorbed by silicon solar cells.

Performance benefit observed when using silicon quantum dots

Solar Cell	Quantum Dots	Host Material	Performance Difference %	Illuminating Spectrum	Reference
a-Si	Ideal QDs	Ideal Plastic	0	AM1.5G	Sark et al., 2004
c-Si	Silicon QDs	SiO_2	0	AM1.5G	Jesin et al., 2010
c-Si	Silicon QDs	Spin-on Glass	+0.4	AM1.5	Svrcek et al., 2004
c-Si	Silicon QDs	Organic Solvent	+0.6	-	Pi et al., 2011
Poly-Si	Silicon QDs	Directly on Cell	+10	Visible Light	Stupca et al., 2007

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