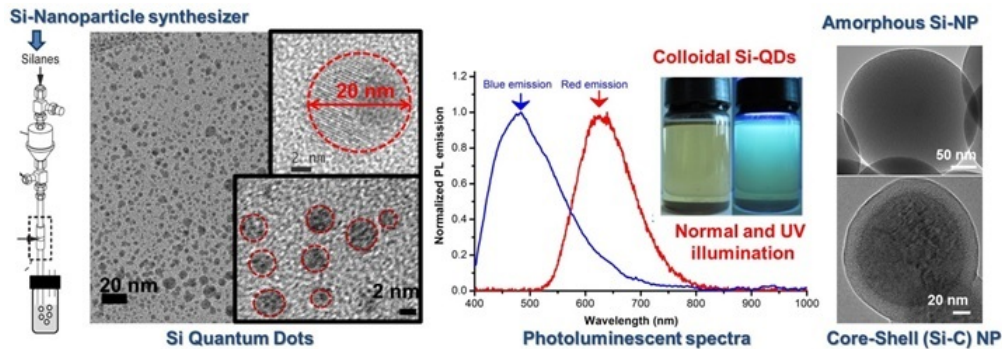


# Continuous Synthesis of Si Nano-Crystals Using Liquid Silanes (RFT-454)

## Invention Summary

Tunable band-gap of silicon nano-crystals (Si-NCs) presents applications such as light emitting diodes, broad-band absorber in solar cells and many more. By engineering the size, crystallinity, surface state (functionalized group) the properties of Si-NCs can be designed to offer variety of opto-electronic properties. Syntheses of freestanding Si-NCs adopt either a low-pressure plasma process with mono-silane or cumbersome chemical reduction processes; these have limited throughput and require additional processing to make them stable. Injection of liquid hydrosilane composition and subsequent pyrolysis allows continuous synthesis of few nm to sub-micron sized particles, with the ability to design the morphology (amorphous, intermediate to crystalline) and surface chemistry (passivation). In addition, by sequential injection of the liquid hydrosilane composition synthesis of core-shell nanoparticles of Si is possible. Synthesis of organic-inorganic photoluminescent hybrid nanomaterials with tunable emission is feasible with this technology.



## Benefits

- Continuous synthesis of Si-QDs
- In-flight passivation with size and surface functionality engineering
- Various forms of Si-NPs possible: degenerately doped, core-shell, Si-NPs etc.
- Particles can be collected dry or in colloidal form

## Applications

These inventions have applicability in the photovoltaics, microelectronics, Li-ion battery (anode), photovoltaic, display, optoelectronic devices and biomedical market.

## Patents

This portfolio contains three separately-disclosed technologies that are all patent pending with worldwide patent rights.

## Status

**Optioned Exclusively in all Fields of Use and in all Territories.**

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