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Functionalized Sila-Adamantane

Tech ID: 32903 / UC Case 2022-883-0

PATENT STATUS

Country	Туре	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	WO 2023/177686	09/21/2023	2022-883
Patent Pending				
FULL DESCRIPTION				
Background:				
The carbon based adamantane has enabled a myriad of valuable applications in medicine, imaging probes, catalysts, etc. because chemists				
have been able to install site selective functional groups. The silicon version of adamantane, sila-adamantane shares similar fundamental				
properties that make it useful. Despite its promise, the development of silicon diamondoids has remained in its infancy because of the difficulty				
in its synthesis.				

Technology:

Prof. Timothy Su and his research team have developed a novel, patent pending method for the gram-scale synthesis and its regioselective functionalization at five discrete silicon centers within its core. These syntheses are guided by mechanistic insights that implicate an aluminatestabilized silylium ion at the 2-position as the final intermediate in the isomerization synthesis.





Site-selective sila-adamantane functionalization С



b Site-selective functionalization Schleyer, Stetter, Landa, 1954-1961



2-functionalization 1-functionalization 1,3,5,7-functionalization

Functional molecules & materials





Materials

Semiconductors

Materials

RELATED CASES

2022-883-0

Synthetic strategies for functionalizing sila-adamantane at five discrete locations within the cluster core, paving the way for functional silicon

diamondoid materials.

ADVANTAGES

The significant aspects of this invention are:

Significantly more efficient as evidenced by the ability to access sila-adamantane on gram scales and in higher purity compared to prior art.

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OTHER INFORMATION

KEYWORDS

Silanes, Oligosilanes, Sila-

Adamantane, Sila-diamondoids, Nano

Electronics, Diamondoids, Silicon

nanocrystals, Catalysts

CATEGORIZED AS

Optics and Photonics

- ► All Optics and Photonics
- **Computer**
 - ► Hardware
- Energy
 - Storage/Battery
- Medical
 - ▶ New Chemical Entities,
 - **Drug Leads**
- Nanotechnology

No chlorinated by-products.

Provides for derivatizing the sila-adamantane cluster in site selective fashion with either the same or unique functional groups.

Atomically precise structure of sila-adamantane is an advantage over existing silicon nanocrystals that are heterogeneous in core size and surface chemistry.

SUGGESTED USES

Applications that could be enabled by this invention include:

Use as a ligand for improved chemical catalysis
Nanoscale silicon electronics
Battery anode materials
Pharmacology and medicine
UV/blue-emitting materials
Atomically precise versions of silicon donor qubits

STATE OF DEVELOPMENT

Experimental, lab-level demonstration of the process. 20 derivatives of sila-adamantane have been successfully synthesized and are ready for

testing.

RELATED MATERIALS

Site-Selective Functionalization of Sila-Adamantane and Its Ensuing Optical Effects

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