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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

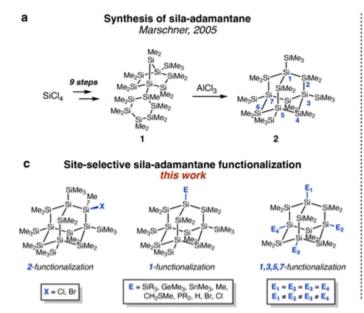
FULL DESCRIPTION

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 aluminate-stabilized silylium ion at the 2-position as the final intermediate in the isomerization synthesis.



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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
 - 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.

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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