



Functionalized Sila-Adamantane

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

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	WO 2023/177686	09/21/2023	2022-883

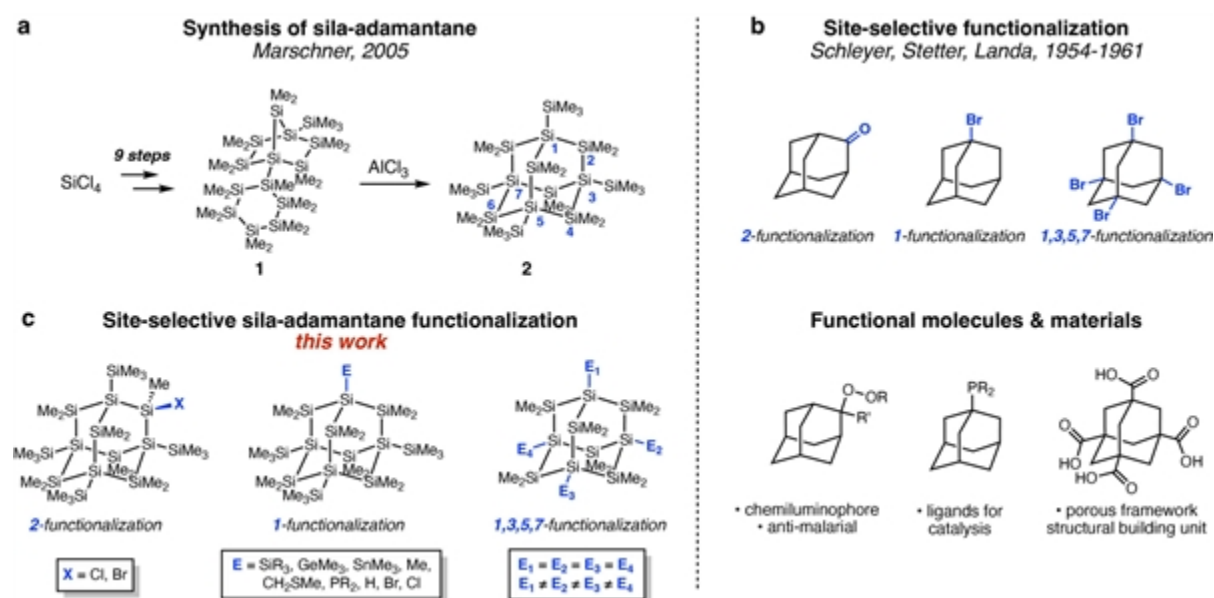
FULL DESCRIPTION

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.



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.
- ▶

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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

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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