Functionalized Sila-Adamantane
Tech ID: 32903 / UC Case 2022-883-0

PATENT STATUS

<table>
<thead>
<tr>
<th>Country</th>
<th>Type</th>
<th>Number</th>
<th>Dated</th>
<th>Case</th>
</tr>
</thead>
</table>

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.

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