

## // SILYLENE-BASED ROUTES TO DEFINED OLIGO- AND POLYSILANES AND DEFINED SILYLCARBANIONS

Ref-No: TA-IN0099

### BACKGROUND

Silicon represents the essential material in electronic applications, as both the semiconductor and the photovoltaic industry rely on silicon-based devices. Typically, oligo- or polysilanes are used as precursors for vapor deposition during the manufacturing process. The defined synthesis of these compounds is associated with high energy demands, as usually plasma or thermal processes are involved.

### SOLUTION

The technologies are based on the finding that formal silylene fragments  $[:SiCl_2]$  can be generated from trichlorosilane and hexachlorodisilane in the presence of ammonium ( $R_4NCl$ ) or phosphonium chloride ( $R_4PCl$ ). These fragments are utilized as building blocks to construct perhalogenated higher silyl anions. By varying the reaction conditions, linear, cyclic or cage-like oligo- and polysilyl anions are obtained. Especially, length/size and branching of the polysilyl anions can be specifically tuned. Hence, defined polysilyl anions are accessible through simple and energy-saving one-step synthesis. cyclo-Hexasilane [20]Silafullerane Silylcarbanions

### ADVANTAGES

- Defined products
- Material properties easily and selectively tunable
- High yields
- Cheap reagents
- Low energy demands

### SCOPE OF APPLICATION



INNOVECTIS Gesellschaft für Innovations-Dienstleistungen mbH

Kirstin Schilling  
06925616320  
info@innovectis.de  
www.innovectis.de

### PATENT SITUATION

DE 10 2014 118 658.3 pending  
DE 10 2015 105 690.9 granted  
DE 10 2013 021 306.1 pending  
DE 10 2015 105 501.5 pending

### CATEGORIES

//New-found chemical substances //White biotechnology //Electrochemical energy systems //Semiconductors

The new silanes can be used in various contexts, but are especially suited for thin film and vapor deposition of amorphous silicon e.g. for solar energy components. The silylcarbanions exhibit defined Si/C ratios. Hence, they are especially suited for manufacturing of defined silicon carbides. After hydrolysis, the branched  $C(SiCl_3)_3$  can be employed as crosslinker in silicones.

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#### SERVICE

Licensing or assignment of the technology is possible as well as a cooperation for further development of the technologies.

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#### PUBLICATIONS & LINKS

[www.onlinelibrary.wiley.com/doi/10.1002/chem.201402655/abstract](http://www.onlinelibrary.wiley.com/doi/10.1002/chem.201402655/abstract)  
[www.onlinelibrary.wiley.com/doi/10.1002/ange.201412050/abstract](http://www.onlinelibrary.wiley.com/doi/10.1002/ange.201412050/abstract)

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