

# PRESS RELEASE

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## Shigeyoshi Inoue Receives the WACKER Silicone Award 2023

**Munich, May 12, 2023 – Shigeyoshi Inoue, Professor of Silicon Chemistry at the Technical University of Munich, is the winner of the WACKER Silicone Award 2023. The chemical company which announced its decision today recognizes Inoue's groundbreaking work, particularly in the field of low-coordinate silicon compounds. A focus of his work is the synthesis and reactivity of novel low-oxidation state silicon complexes. Inoue, who has been Professor at TU Munich since 2015, will receive the award on July 10 at the 10th European Silicon Days in Montpellier, France. The award carries with it a purse of €10,000.**

Because of their high productivity and selectivity, catalytic reactions form the basis of many highly efficient and sustainable production processes. Well over 80 percent of all reactions in the chemical industry are currently carried out with the aid of catalysts. So far, precious metals have dominated as active components. That could soon change if the scientist Shigeyoshi Inoue has his way. The 42-year-old professor at the Institute of Silicon Chemistry at the Technical University of Munich wants nothing less than to develop the element silicon into the new catalysis star. His research work is therefore not only groundbreaking from a scientific point of view. It also holds enormous potential for future applications in wide areas of the chemical industry.

Inoue's work focuses on three subject areas: low-valent main-group compounds, transition metal complexes with silicon-based ligands, and main-group metal hydrides. Low-valent compounds of main-group elements have been shown to be able to activate relatively inert bonds without requiring substantial amounts of energy. However, to offer a real alternative to transition metals, the catalytic potential of the new compounds still needs to be fully exploited.

The research work conducted by Inoue's group makes a major contribution to this area. Its focus is on the synthesis, characterization and reactivity of novel low oxidation state group 13, 14 and 15 complexes. The overall goal is, through a combined experimental and theoretical approach, to gain an understanding of the key processes that enable catalytic turnover.

Another area of Inoue's research is transition metal complexes with silicon-based ligands. As powerful and selective catalysts, they could activate small, unreactive molecules for efficient synthesis of complex organic molecules, pharmaceuticals and polymers. Here, too, Inoue's focus is on the synthesis of novel reagents and catalysts based on silicon-metal complexes and their subsequent use in the development of efficient catalytic processes. Inoue's research group has particularly studied processes for activating small molecules such as methane, the main component of natural gas, and ammonia. Small molecule activation is an important area of chemistry that enables the efficient conversion of simple chemical feedstocks into complex products with high added value and minimal waste.

Professor Inoue has also distinguished himself with his work on main group metal hydrides. Many main group metal hydrides are strong reducing agents and allow the conversion of compounds with inert element-element bonds into more reactive species. Metal hydrides are considered as fuel storage systems that could play an important role in an alternative hydrogen-based energy supply concept in the future. Shigeyoshi Inoue and his research group focus on the synthesis and reactivity of novel hydrido complexes of main group metals, such as boron, aluminum, gallium, silicon, germanium, and tin, using tailored ligand systems. In particular, the activation of comparatively unreactive carbon bonds with hydrogen, oxygen, and nitrogen as well as carbon-carbon bonds often found in organic substrates, or element-element bonds in starting materials – e.g. elemental phosphorus and sulfur – is of great interest.

“Shigeyoshi Inoue’s studies in the field of low-valent silicon compounds are groundbreaking”, emphasizes Dr. Christoph Kowitz, head of WACKER’s corporate R&D department. “His work is significant not only from a scientific perspective. One day, it will be of great use to industry as well and will pave the way for us to create novel reagents and catalysts.”

Shigeyoshi Inoue began his scientific career at the University of Tsukuba in Japan, where he received his PhD from Professor Akira Sekiguchi in 2008. As a fellow of the Alexander von Humboldt Foundation and the Japan Society for the Promotion of Science JSPS, he continued his research work with Professor Matthias Driess at the Technical University of Berlin. Here, he led his own research group from 2010 to 2015 as Sofja Kovalevskaja professor. Since 2015,

Inoue has been a professor of silicon chemistry at the Technical University of Munich and thus part of the WACKER Silicon Institute, as well as a member of the TUM Catalysis Research Center.

With more than 30 awards and 165 scientific publications, the award-winner enjoys a high international reputation. “Inoue’s work, research and commitment to young scientists are exemplary. We all benefit from this”, says Christoph Kowitz. “For this and for his great services to silicon research, Professor Inoue is now the 22nd recipient of WACKER’s Silicone Award.” The award ceremony will take place on July 10 during the 10th European Silicon Days in Montpellier, France.

### **WACKER Silicone Award**

The Silicone Award presented by the Munich-based WACKER chemical group carries with it a purse of €10,000 and is given to outstanding research scientists in the field of silicone and organo-silicon chemistry. Previous recipients of the WACKER Silicone Award since its inception in 1987 are listed below.

- 2023 Prof. Shigeyoshi Inoue (Technical University of Munich, Germany)
- 2021 Prof. Matthias Oestreich (Technical University of Berlin, Germany)
- 2018 Prof. Herbert W. Roesky (University of Göttingen, Germany)
- 2016 Prof. Alexander Filippou (University of Bonn, Germany)
- 2014 Prof. Akira Sekiguchi (University of Tsukuba, Japan)
- 2011 Prof. Matthias Driess (Technische Universität Berlin, Germany)

- 2009 Prof. Ulrich Schubert (Technical University of Vienna, Austria)
- 2007 Prof. Dr. Yitzhak Apeloig (Israel Institute of Technology, Haifa)
- 2005 Prof. Mitsuo Kira (Tohoku University, Japan)
- 2003 Prof. Don Tilley (University of California at Berkeley, USA)
- 2001 Prof. Manfred Weidenbruch (University of Oldenburg,  
Germany)
- 1998 Prof. Robert Corriu (Université de Montpellier, France)
- 1996 Prof. Hubert Schmidbaur (Technical University of Munich,  
Germany)
- 1994 Prof. Edwin Hengge
- 1992 Prof. Richard Müller and Prof. Eugene Rochow
- 1991 Prof. Hideki Sakurai (Science University of Tokyo, Japan)
- 1989 Prof. Robert West (University of Wisconsin, USA)
- 1988 Prof. Nils Wiberg (†),  
Prof. Reinhold Tacke (University of Würzburg, Germany)
- 1987 Prof. Peter Jutzi (Bielefeld University, Germany),  
Prof. Norbert Auner (Goethe University Frankfurt, Germany)



Shigeyoshi Inoue, Professor of Silicon Chemistry at the Technical University of Munich, receives WACKER's Silicone Award in July. (photo: WACKER)

**Note:**

This photo is available for download at:  
<http://www.wacker.com/pressreleases>

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**The Company in Brief:**

WACKER is a global chemical company with some 15,700 employees and annual sales of around €8.21 billion (2022). WACKER has a global network of 27 production sites, 26 technical competence centers and 50 sales offices.

**WACKER SILICONES**

Silicone fluids, emulsions, rubber grades and resins; silanes; pyrogenic silicas; thermoplastic silicone elastomers

**WACKER POLYMERS**

Polyvinyl acetates and vinyl acetate copolymers and terpolymers in the form of dispersible polymer powders, dispersions, solid resins and solutions

**WACKER BIOSOLUTIONS**

Biotech products such as cyclodextrins, cysteine and biologics, as well as fine chemicals and PVAc solid resins

**WACKER POLYSILICON**

Polysilicon for the semiconductor and photovoltaic industries