

# Prelog Medal 2008

Eidgenössische Technische Hochschule Zürich  
Laboratorium für Organische Chemie

Prof. Jack Dunitz  
presenting the  
Prelog medal to Prof.  
Masakatsu Shibasaki  
(Photo R. Häfliger)



Professor **Masakatsu Shibasaki** obtained his Bachelor's degree in 1969 and Ph.D. in 1977 at the University of Tokyo under the direction of Professor Shun-ichi Yamada. From 1974–1977, he was a postdoctoral research associate in the laboratory of Professor E. J. Corey at Harvard University. In 1977, he joined the group of Professor Shiro Ikegami at Teikyo University as an Associate Professor. He then moved in 1983 to Sagami Chemical Research Center as a Research Group Leader, and then to Hokkaido University as Professor (1986). In 1991, he was appointed Professor of the Graduate School of Pharmaceutical Sciences at the University of Tokyo. He was selected as Vice-President (2005–2006) and President (2006–2007) of the Pharmaceutical Society of Japan, as well as Dean of the Graduate School of Pharmaceutical Sciences (2006–2008). He has been elected Fellow of the Royal Society of Chemistry (1997), Honorary Fellow of Chemical Research Society of India (2003), Honorary Member of Chemical Society of Japan (2006) and member of Science Council of Japan (2006).

Professor Shibasaki has established himself as a leader in the development of new methods for asymmetric synthesis. Among the numerous important contributions to the area, he is well known for the discovery and development of bifunctional asymmetric catalysis. In the efficient methods he has crafted, catalysis is mediated by heterobimetallic chiral complexes that combine Lewis acid and Brønsted base properties in one system. In general these complexes are composed of alkali metal and rare-earth-metal cations held together by the chiral ligand BINOL (1,1'-bi-2-naphthol). These complexes constitute a new paradigm in catalyst design that promise to revolutionize the field and certainly open new opportunities in chemistry.

These catalysts allowed the first catalytic, enantioselective nitroaldol reactions, which have been used to prepare important biologically active compounds, including propranolol, metoprolol, and pindolol, which are members of a class of cardiovascular drugs called  $\beta$ -blockers; *threo*-dihydrosphingosine, a protein kinase inhibitor that has potential as a cancer treatment; and allophenylnorstatine, a key substructure in various anti-HIV agents. A number of these catalysts have been successfully implemented in the preparation of multi-kilogram quantities of several key pharmaceutical intermediates. Bifunctional asymmetric catalysis has also made possible an efficient catalytic asymmetric

Michael reaction at room temperature. Optically pure Michael reaction products prepared in this way have enabled total syntheses of several indole alkaloids, including strychnine.

More recently, Professor Shibasaki has been using new bifunctional asymmetric catalysts derived from carbohydrate or amino acid scaffolds to enable the synthesis of quaternary stereogenic centers. This has been a long sought-after goal in chemical synthesis, and Professor Shibasaki has discovered and developed several transformations that are practical. Another focus of Shibasaki's research program is development of sequential catalytic processes, whereby one asymmetric catalyst promotes several distinct transformations in a single reaction vessel.

Professor Shibasaki is credited with more than 450 publications and patents. Without question, he is one of the most prolific, creative, and innovative scientists in chemistry in the world. Professor Shibasaki is the most cited author for the past 10 years (Jan. 1, 1995–Aug. 31, 2005) in the asymmetric catalysis research field, according to the research by Thomson ISI. This is borne out by the numerous honors and awards have been bestowed in honor of Shibasaki's scientific contributions. In 1981 he was the recipient of the Pharmaceutical Society of Japan Award for Young Scientists. Subsequently, in the 1990s Shibasaki received honors worldwide: Inoue Academic Prize (1994), Fluka Prize (1996), Tetrahedron Chair (1998), Pharmaceutical Society of Japan Award (1999), and the Molecular Chirality Award (1999). More recent recognition of Shibasaki's achievements are: the Naito Prize and Arthur C. Cope Senior Scholar Award (2002), the Japanese National Prize of Purple Ribbon (2003), the Torey Science Award (2004), the Japan Academy Prize (2005), the Takamine Memorial Sankyo Award (2006), the Rare Earth Society of Japan Award (2007), and the ACS Award for Creative Work in Synthetic Organic Chemistry (2008).

## Prelog Lecturers

1986	Kurt Mislow
1987	Meir Lahav and Leslie Leiserowitz
1988	K. Barry Sharpless
1989	Jeremy R. Knowles
1990	Henri B. Kagan
1991	Clayton H. Heathcock
1992	J. Michael McBride
1993	Hisashi Yamamoto
1994	Jean-Pierre Sauvage
1995	Yoshito Kishi
1996	David M.J. Lilley
1997	Günter Helmchen
1998	Lia Addadi
1999	David Evans
2000	Helmut Schwarz
2001	Robert H. Grubbs
2002	David E. Cane
2003	Andreas Pfaltz
2004	Marvin H. Caruthers
2005	Ben L. Feringa
2006	Manfred T. Reetz
2007	Scott E. Denmark