Synlett

Editorial – Special Issue dedicated to Prof. Hisashi Yamamoto

I am very pleased to dedicate this SYNLETT special issue in honor of Prof. Hisashi Yamamoto's 80th birthday.

He was born on July 16, 1943, in Kobe, Japan. He received his Bachelor of Science degree from Kyoto University in 1967 and his PhD from Harvard University in 1971. In 1971 and 1972, he worked at Toray Industries, Inc. as a researcher. He then returned to the academic world, first as an instructor and then as lecturer at Kyoto University from 1972 to 1977. He moved to the University of Hawaii as an Associate Professor in 1977–1980 and returned to Nagoya University as an Associate Professor in 1980–1983 and as a full professor in 1983–2002. From 2002 to 2012, he was a Professor at the University of Chicago. He is currently Professor and Director of the Molecular Catalyst Research Center at Chubu University and Professor Emeritus at the University of Chicago and Nagoya University.

Prof. Yamamoto has exploited novel aspects of Lewis and Brønsted acid catalysts in selective organic synthesis. During his research career, he has discovered a wide variety of new synthetic methodologies, useful reagents, and catalysts based on acid-catalyzed chemistry. Through his great contribution to this area, Lewis and Brønsted acids are now recognized as reliable tools in the synthesis of various organic molecules. Prof. Yamamoto's many superb contributions are described below:

First, his research in the area of organoaluminum chemistry has had a great impact on organic synthesis. The strong Lewis acidity of organoaluminum reagents appears to account for their strong tendency to form a stable 1:1 complex with various types of substrates. His aluminum amide reagents for epoxide rearrangement, organoaluminum-promoted biogenetic-type terpene synthesis, and the Beckmann rearrangement–alkylation sequence are notable examples. He was intrigued by the chemistry of the carbonyl compound–Lewis acid complex, and introduced the exceptionally bulky organoaluminum reagents, methylaluminum bis(2,6-di-tert-butyl-4-methylphenoxide) (MAD) and aluminum tris(2,6-diphenylphenoxide) (ATPH). The MAD and related reagents were successfully utilized for the selective alkylation of cyclic ketones and aldehydes to generate equatorial alcohols and anti-Cram products, respectively, for stereoselective Claisen rearrangements, for regioselective Diels–Alder reactions, and for epoxide–aldehyde rearrangements. The ATPH/aromatic carbonyl complex reacts with nucleophiles selectively at the para position of the aromatic ring to generate cyclohexadiene derivatives. After these pioneering works in Lewis acid chemistry, Prof. Yamamoto has developed asymmetric methodologies by designing chiral Lewis acids in modern asymmetric synthesis. In 1985, he first introduced chiral binaphthol as a key ligand for chiral Lewis acid catalysts. Based on his knowledge of organoaluminum chemistry, he designed a new chiral organoaluminum catalyst for asymmetric hetero-Diels–Alder reaction. A similar concept was employed for his catalytic asymmetric protonation under acidic conditions, which is useful for asymmetric polyene cyclizations.

His discovery of tartaric acid-based chiral (acyloxy)borane (CAB) catalysts and amino acid based borane catalysts led to the first enantioselective Diels–Alder reactions of a broad range of dienes and dienophiles. The same catalysts were shown to be the first highly efficient catalysts for asymmetric aldol and ene-type reactions. He also found Lewis acid catalysts could play an important role for new hafnium-catalyzed esterifications and boron-catalyzed amidations. More recently, he has developed new asymmetric oxidation processes based on an acid catalysis concept. His asymmetric nitroso chemistry offers an entirely new access to introduce oxygen and/or nitrogen into the molecule. His pyridine-based nitroso- and azo-hetero-Diels–Alder reactions provide a powerful tool for asymmetric synthesis. He also reported asymmetric epoxidation of homoallylic alcohols based on new chiral vanadium catalysts.

At The University of Chicago, he proposed the use of 8-hydroxyquinole based chiral Lewis acid catalysis. The catalyst is designed as a rigid metal complex of cis-b configuration with a brand-new 'privileged ligand' for asymmetric synthesis such as catalytic asymmetric pinacol coupling, NH reaction, Mukaiyama–Michael addition, and Pudovik reactions. After moving to Japan, he started his own peptide

chemistry in Chubu University, and is now extensively redefining ordinary peptide chemistry for new peptide drug synthesis.

With these tremendous research works, Prof. Yamamoto has received numerous awards including The Chemical Society of Japan Award for Young Chemist (1977), IBM Science Award (1988), Houkou Award (1991), Chunichi Cultural Prize (1992). Prelog Medal (1993), Merck–Schuchardt Lectureship Award (1994), The Chemical Society of Japan Award (1995), Toray Science and Technology Award (1997), Max Tishler Prize (1998), Le Grand Prix de la Fondation Maison de la Chimie (2002), Medal of Honor with Purple Ribbon (Japan) (2002), Molecular Chirality Award (2003), Yamada Prize (2004), Tetrahedron Prize (2006), The Karl-Ziegler Professorship (2006), The Japan Academy Prize (2007), Humboldt Research Award (2007), ACS Award for Creative Work in Synthetic Organic Chemistry (2009), Grand Prize of Synthetic Organic Chemistry of Japan (2009), Noyori Prize (2011), Fujiwara Prize (2012), ACS Roger Adams Prize (2017), Orders of the Sacred Treasure (2018), The Person of Cultural Merit (2018), and the Barluenga Lectureship Medal (2018).

In 1989, Hisashi Yamamoto joined the editorial board of SYNLETT, a journal launched for the publication of Rapid Communications and Accounts, with Peter Vollhardt as Editor-in-Chief and Bernd Giese, Steven Ley, and Victor Snieckus as co-editors. The journal consistently championed young scientists and provided students with easy and inexpensive access to the articles. For several years, Hisashi Yamamoto has made invaluable contributions to the evolution of the journal, and he has coordinated the cluster section on SYNLETT, which feature collections of papers on topics of exceptional current interest. He stepped down as SYNLETT editor in 2012, but he is sill a highly valued member of the editorial board of SYNFACTS, responsible for the category 'Peptide Chemistry'.

His passion for research is extraordinary professional. It is easy to guess from the fact that his research style has not changed at all even at the age of 80. Surprisingly, he has succeeded to obtain the highest personal research grant, the Grant-in-Aid for Specially Promoted Research, for five years starting in April this year. Apparently, his enthusiasm has been a great stimulus not only to his former students and postdocs, but also to many researchers in Japan and worldwide. I am very happy to dedicate this issue to Prof. Yamamoto on his 80th birthday, and I am excited to present the invited articles in the following pages.

Keiji Maruoka
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