PREFACE

It is a great honor and privilege to contribute the preface to this special issue dedicated to Professor Teruaki Mukaiyama, "Mr. Organic Synthesis", who has exercised strong leadership in chemistry in Japan and worldwide. Adhering to the highest standards of scientific and social integrity, he has been an extraordinarily influential figure as researcher, educator, and administrator.

Professor Mukaiyma, born in 1927, was educated at Tokyo Institute of Technology under the guidance of Professor Toshio Hoshino. In 1953, he accepted his first academic position, Assistant Professor at Gakushuin University. He returned to Tokyo Institute of Technology as Assistant Professor in 1958 and became Professor in 1963. In 1974, he accepted the post of the Professor at the University of Tokyo and stayed there until 1987. Professor Mukaiyama then initiated another successful career at the Science University of Tokyo, where as Distinguished Professor, he is now active in research.

I deeply respect his outstanding contributions to the field of synthetic organic chemistry. Throughout his long and distinguished career, Professor Mukaiyama has undertaken highly creative research in this important field. In particular, the development of new synthetic methodologies and the applications are remarkable. Early in his career, he developed a convenient way to generate nitrile oxides (1,3-dipoles) and an oxidation–reduction condensation method using 2,2'-dipyridyl disulfide and triphenylphosphine, which is useful for the synthesis of peptides, nucleotides, and macrolides. He also devised an efficient dehydration method using onium salts of aza-aromatics under neutral conditions. Professor Mukaiyama invented a series of methods for the construction of carbon skeletons as well. The most noteworthy of these includes aldol and Michael reactions using enol silyl ethers or boron enolates and Lewis acid promoters such as $TiCl_4$, $Sn(OTf)_2$, and $(C_6H_5)_3COTf$. In the field of asymmetric synthesis, he developed, among others, a highly enantioselective addition of alkyllithiums or Grignard reagents to aldehydes aided by chiral amino alcohols, enantioselective aldol and Michael reaction with chiral diamine/$Sn(OTf)_2$ promoters, and enantioselecive $NaBH_4$ reduction of aromatic ketones using chiral Co(II) catalysts. Professor Mukaiyama also invented a stereoselective method for glycosylation using 1-fluoro sugars or other glycosyl donors and various sophisticated Lewis acids. Recently, he developed an efficient process for oxygenation of simple alkenes with molecular oxygen and aldehydes or 2-propanol catalyzed by Co, Ni, or Mn complexes. His synthesis of nitro-olefins from olefins and nitrogen oxide is also noteworthy. Because of their high generality and selectivity, many of his new reactions have strong potential in research of the development of new pharmaceuticals and other biologically active compounds.

Professor Mukaiyama is proud of his recent success in asymmetric total synthesis of taxol. Unlike the approaches of other researchers, his success relies on a unique strategy using his original aldol chemistry to construct first the B ring (eight-membered ring) and then the C and A rings. This is truly a landmark in Professor Mukaiyama's academic career.

The foregoing describes only a few of Professor Mukaiyama's brilliant contributions to modern organic chemistry. He is a true experimentalist and believes only experimental observations. Professor Mukaiyama normally lectures with more than 80 slides illustrating experimental results. His energetic, encouraging talk is called a "strobe-shot lecture". After a standard lecture in this style, an eminent chemist raised a question regarding the mechanism of his reaction, "Teruaki, congratulations on your great success. However, I really don't understand your solvent effect. What do you think of it? Did you try any other solvents?" The lecturer firmly answered, "We did everything. Only that worked." This is the way Professor Mukaiyama conducts research.

Professor Mukaiyama's creativity and productivity are unmatched. He has already been recognized nationally and internationally with many awards and honors, which include the Chemical Society of Japan Award (1973), the Imperial Prize and the Academy Prize (1983), the Copernicus Medal (1986), the Fujiwara Prize (1987), Person of Cultural Merit (1992), the Society of Synthetic Organic Chemistry, Japan, Special Award (1994), Chevalier de l'Ordre National due Mérite, France (1994), the American Chemical Society Award for Creative Work in Synthetic Organic Chemistry (1996), Order of Culture (1997) and the Tetrahedron Prize (1998) among others. Professor Mukaiyama was elected to the Japan Academy in 1995 and is also a Foreign Member of the Polish Academy of Sciences and the French Academy of Sciences.

Professor Mukaiyama's endeavors are not limited to research. He is a passionate educator. At four different universities, he taught more than 300 students. Professor Mukaiyama's students received a tremendous learning experience through collaboration with this extraordinary mentor. Such educational contribution amplified his overall influence. Furthermore, Professor Mukaiyama exercised outstanding leadership as President of the Chemical Society of Japan (1986–1987) and the Society of Synthetic Organic Chemistry, Japan (1989–1991).

Single-minded in his belief in the importance of synthetic organic chemistry, Professor Mukaiyama has served as a vigorous and dedicated leader of our community. He is still full of imagination and energy, and I am certain that he will continue to be active in research and education. Last but not least, behind a great man is always a clever woman. Professor Mukaiyama would not have been successful without the support of the intelligent, thoughtful Mrs. Hiroko Mukaiyama, whose efforts should be deeply appreciated. I wish the Mukaiyama family continued success, health, and happiness.

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