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Design and Synthesis of Cyclometalated Iridium (III) Complex-Peptide Hybrids for the induction of Cancer Cell Death

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Cyclometalated iridium (III) complexes such as fac-Ir(tpy)3 (tpy = 2-(4′-tolylpyridine) are strong triplet luminescent organometallics not only in the production of organic light-emitting diodes (OLED) but also as chemosensors and bioimaging agents, due to their excellent photophysical properties and stability even in aqueous solution [1]. In this paper, we present the design and synthesis of new cyclometalated Ir complex-peptide hybrids (IPHs) as detectors of cancer cells and/or inducers of their cell death [1,2] based on the regioselective substitutions [3]. The IPHs linked with cationic peptides such as GGKK(K) sequences through C6 or C8 linker exhibit potent cytotoxicity against Jurkat cells and strong green emission from IPHs were observed in dead cells [2]. On the other hand, it was found that IPHs having cyclic peptides that had been reported to bind to death receptor (DR) of cancer cells bind to DR5 expressed on cancer cells and induce their necrosis-type [3a] or apoptosis-type cell death [3b]. In this paper, these results will be reported.

Speaker Biography

Shin Aoki graduated from the University of Tokyo with B. S. (1986), M.S. (1988), and Ph.D. (1992) degrees in pharmaceutical sciences under the supervision of Prof. Kenji Koga. He started his academic carrier as an assistant professor at the University of Tokyo from 1990. Following postdoctoral positions with Professor Chi-Huey Wong at the Department of Chemistry, the Scripps Research Institute, USA, he joined Prof. Eiichi Kimura's research group in 1995 at the Faculty of Medicine, Hiroshima University, where he became an associate professor in 2001. In 2003, he was promoted to a professor at the Faculty of Pharmaceutical Sciences, Tokyo University of Science, and has been appointed as the Vice Dean of Research Institute for Science and Engineering, Tokyo University of Science, since 2018. He is a recipient of the Award of Japan Society of Coordination Chemistry for Young Scientists (1999), the AJINOMOTO Award in Synthetic Organic Chemistry, Japan (2001), the Pharmaceutical Society of Japan Award for Young Scientists (2002), and so on. His major research interests are organic synthetic chemistry, bioinorganic chemistry, supramolecular chemistry, photochemistry, and medicinal chemistry, mainly using metal complexes in aqueous solutions.

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