The Photopolymer Science and Technology Award

The Photopolymer Science and Technology Award No.041100, the Outstanding Achievement Award 2004, was presented to Tsuguo Yamaoka (Chiba University) for his outstanding achievements in photopolymer science and technology, "Research of High Performance and Multifunctional Photopolymers".

Tsuguo Yamaoka is Professor at Faculty of Engineering, Chiba University. He received his B.S. degree in engineering of printing and photography from Chiba University, and started his research of photopolymers at the university from 1962. He stayed at the University of Tokyo from 1966 and received Ph. D. degree from the University of Tokyo in 1971. In 1972, he made a study of excited-state acid dissociation of protonated all-trans Retinal Schiff base as a post-doctoral fellow at University of Houston. He was promoted to an associate professor in 1975, and a professor in 1982 at Chiba University. In 1990, he had a mission of the photopolymer technical guidance under UNIDO in Beijing. In 1990, he made advance in his studies for micro-fabrication as a visiting scientist at IBM Almaden Research Center. Prof. Yamaoka published a large number of research papers, reviews, books and patents, including 45 articles in Journal of Photopolymer Science and Technology, for his 42 years research career.

Prof. Tsuguo Yamaoka has contributed to the field of photopolymer to lead the way of high efficiency and multifunctional photo-reactive materials on the advancement of industry for a long time.

In the early years of his research, he studied the reaction of charge transfer complex and the photochemistry of Retinal Schiff base, a visual sensing material. His first challenge to the photopolymer was the molecular design of aromatic diazonium salts and azides to give higher sensitivity to the photopolymer by a molecular orbital calculation.

He has kept up his interest to the photosensitization and photochemical mechanism in polymer matrices,[4,7-8,29,36-37,43] simultaneously he developed novel photo radical generators,[18,42] photo acid generators [7,8-9,39,45] and photo base generators, [16,21,24] among which typical one is now available commercially as diphenyliodonium 9,10-dimethoxynaphthalene-2-sulfonate (DIAS). Furthermore, he proposed many photo-functional polymers based polyimides[2,5,11-12,14,19, 21,40] and various polymers[27,31,34,38] in combination with these photo-X-generators.

He also designed interesting photo-functional polymers,[3,15,26,28,33] and reached the concept of photo-functional heterogeneous materials such as microgel[13,23,30] photopolymer.

One of his unique works is the photopolymer system which has the process of cross-linking in film and de-cross-linking by photo-acid-generator system called "Yamaoka System", using the acetal bond formation and decomposition reaction between vinyl ether and protic hydroxyl group. By the concept, any polymer having the functional group can be used as a photopolymer. He expanded the photopolymer "Yamaoka
System” to VIS[32,41], UV[17], DUV[22,25,44], light and X-ray[20,22] sensitive ones, and to the photo polyimide.[40]

Prof. Yamaoka was pioneering the high sensitive, heat resistant, and multi functional photopolymer, and he has been devoted himself to the growth and prosperity of photopolymer science and technology, especially as one of the founding members of the Conference of Photopolymer Science and Technology and the Journal of Photopolymer Science and Technology.

References
30 T. Takahashi, H. Watanabe, N. Miyagawa, S.


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