The Photopolymer Science and Technology Award

The Photopolymer Science and Technology Award No. 101100, the Outstanding Achievement Award 2010, was presented to Koji Nozaki (Fujitsu Laboratories) for his outstanding achievements in photopolymer science and technology, "Development of Adamantane Polymers for 193nm Resists".

Koji Nozaki

Koji Nozaki received his M.S. degree in Synthetic Organic Chemistry from Hokkaido University in 1988. He joined Fujitsu Limited in 1988 and he began research of resist materials for microlithography. Since 1993, he has been in Fujitsu Laboratories. He is now a research fellow and responsible for materials for microdevices. Throughout his career, he has been engaged in development of resist and lithography related materials, especially polymers for advanced microlithography. He has published more than 50 research papers and patents. Many articles have been published in Journal of Photopolymer Science and Technology.

During his career, Mr. Nozaki has contributed to the progress of photopolymer science and technology. His research interests include development of resist materials for microlithography and their applications to advanced lithography.

With increase in density of semiconductor, the minimum feature size of patterns has been scaled down to 32nm. The development of lithography and resist technology is accelerated to meet the requirements. 193nm lithography and immersion lithography with 193nm exposure are mainly used for pattern fabrication below 100nm and to 32nm in terms of its short wavelength. However, the initial period of the development of 193nm lithography, there were serious issues of resist. Acryl or methacryl polymers, which can be used for their high transmittance at 193nm, have very poor etching durability, so they could not be applicable to actual device fabrication.

In order to resolve these problems, Mr. Nozaki intended to develop 193nm resist polymers having both of high transmittance and excellent etching durability. He world-firstly developed adamantane polymers from 1990 and found these polymers

satisfy the requirements. Also, in 1996, he developed acid-rebible adamantane polymers, which led to the functional polymers having all 193nm resist requirements (transmittance, etching durability, acid-rebility).

These polymers are essentially used in semiconductor production for 193nm resists and 193nm immersion resists, so their industrial values cannot be overestimated. In other words, without adamantane polymers high integration of devices was not realized.

These original research works are valuable for accelerating the implementation of 193nm lithography to production in terms of basic findings and application to this lithography. His significant research results very contribute to semiconductor industry.

His important researches have been presented at the Conference of Photopolymer Science and Technology and the paper has been published in Journal of Photopolymer Science and Technology. The first paper of his research of adamantane polymers was published in 1992 in Journal of Photopolymer Science and Technology and after that his many papers were published in the journal,

so this award derived from this journal.

These contributions give the fundamental and practical aspects of 193nm lithography technologies and open an advanced possibility of this lithography for the field of industrial application.

Mr. Nozaki performed a pioneering work on adamantane polymers and their applications to advances resist materials. He has been devoting himself to the progress of photopolymer science and technology.

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