The Photopolymer Science and Technology Award

The Photopolymer Science and Technology Award, No. 97100, was presented to Satoshi Takechi Makoto Takahashi, Akiko Kotachi, Koji Nozaki*, Ei Yano* and Isamu Hanyu (Fujitsu Limited,*Fujitsu Laboratories Ltd.) for their outstanding contribution published in Journal of Photopolymer Science and Technology 9(3), 475-487 (1996), entitled "Impact of 2-Methyl-2-Adamantyl Group Used for 193-nm Single-Layer Resist".

Satoshi Takechi received his B.E. degree in Physical Chemistry from Osaka University in 1980. He has held engineering position with Fujitsu Limited. He worked for 10 years as an electron beam resist development engineer.

Currently, he is working on the optical lithography project where he is responsible for ArF resist development.

Makoto Takahashi received his M. S. degree in Chemistry from Tohoku University in 1992. He joined Fujitsu Limited in 1992, where he worked as an ArF resist development engineer. Currently, he is working in Association of Super-Advanced Electronics Technologies (ASET) as a researcher in Hyper-fine optical lithography laboratory, Single layer resist team.

Akiko Kotachi received her B.E. degree in Applied Chemistry from Keio University in 1988. She joined Fujitsu Limited and worked on Silicon containing polymers as 2-layer resist material from 1988 to 1994. She is currently engaged in development of ArF excimer laser resist materials.
Koji Nozaki received his M.S. degree in Synthetic Organic Chemistry from Hokkaido University in 1988. He joined Fujitsu Limited in 1988 and began research of resist materials for microlithography. Since 1993 he has been a research staff member in Inorganic and Polymers Laboratory at Fujitsu Laboratories Ltd. His research interests involve the design and synthesis of advanced resist materials for future lithography.

Ei Yano received his M.S. degree in Polymer Chemistry from Hokkaido University in 1982. He joined Fujitsu Laboratories Ltd. in 1985, and he has been a researcher of organic materials for electronic devices at Inorganic Materials and Polymers Laboratory. His research interests are the resist materials for future lithography.

Isamu Hanyu received his B. E. and M.E. degrees in Electronics from the Himeji Institute of Technology, Himeji, Japan, in 1978 and 1980, respectively. In 1980, he joined Fujitsu Laboratories Ltd., where he researched high-speed integrated circuits using Josephson devices and high electron mobility transistor (HEMTs). Since 1993, he has been responsible for the development of optical lithography at Process Development Div. in Fujitsu Limited. He is a member of the Institute of Electronics, Information and Communication Engineers of Japan, and the Japan Society of Applied Physics.

Satoshi Takechi, Makoto Takahashi, Akiko Kotachi, Koji Nozaki, Ei Yano and Isamu Hanyu developed a new 193 nm chemically amplified positive resist. They found that a 2-methyl-2-adamantyl ester was cleavable by protonic acid and poly(2MAdMA) (2-methyl-2-adamantyl methacrylate) worked as a chemically amplified resist with good sensitivity. They achieved a minimum resolution with 0.15 μm line-and-space patterns and a depth of focus of 0.6 μm at 0.18 μm line-and-space patterns using a 2MAdMA-MLMA (mevalonic lactone methacrylate) 1).

In 1992, they firstly presented their results in Journal of Photopolymer Science and Technology 2). The concept of alicyclic group incorporated in acyclic polymer was very sensational. The exhibited in the developed resist both satisfaction of etching durability and transparency at 193 nm using alicyclic group, which was the most serious issue for 193 nm resist. The innovation has been very helpful for many researchers. Since then, they had reported excellent improvements of their resists (1994, 1996) 2,3).

This year, they drastically improved their results. Using a 2-methyl-2-adamantyl group, the dissolution characteristics of resist has been much improved, which has leaded the minimum resolution down to 0.15 μm 4). This concept
and its characteristics are very impactive. It very contributes to 193 nm resist advance and moreover 193 nm lithography advance.

References

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