[III~4] 〔초 청〕

Plasma Source Ion Implantation - A Three Dimensional Ion Implantation Technique

Seunghee Han, Haidong Kim, Yeonhee Lee, Junghye Lee, Sue-Gene Kim

Advanced Analysis Center, Korea Institute of Science and Technology
Department of Chemistry, Kyunghee University

Ion implantation is a well-established technique for doping impurity elements in semiconductor manufacturing process. Recently, ion implantation has been extensively studied to modify materials surface especially for improving the hardness, friction, wear, and corrosion properties. For example, it is well-known that by nitrogen ion implantation the lifetimes of tools and dies can be increased by factors of several times.

Since its invention in 1987 by Control and co-workers at the University of Wisconsin, plasma source ion implantation (PSII) has been known to be an innovative technique which can overcome the restrictions of beam-line ion implantation for three dimensional targets.

In PSII, the target to be implanted is immersed in a bulk plasma generated in a vacuum chamber and pulse-biased by successive negative high voltage pulses. The ions are extracted from the plasma and are accelerated in the sheath between the target and the plasma. They are implanted on the surface of the target with energies corresponding to the bias-voltage applied to the target. By this way, the uniform ion implantation all over the exposed surface can be achieved without necessitating the target manipulation, which is one of the major restrictions when implanting three dimensional target with beam-line ion implantation technique.

In this talk, the principle, device, and application results of Plasma Source Ion Implantation on various materials will be reported and discussed.