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ZEON Corporation has successfully developed ZEOMAC™, a new low-dielectric constant inter-layer insulation film (Low-k) material with a dielectric constant of dramatically lowered to 2.2, for use in the manufacture of semiconductors. The new Low-k material is a circular C5F8 fluorocarbon compound that has a higher film density than porous silica (a Low-k material that has been put into practical use) and superior mechanical strength with close adhesion. This new technology firstly enables multi-layer minute processing that was believed to be impossible. The new compound is formed into a practical film using a microwave-excited high-density plasma device developed by Professor Tadahiro Ohmi of the New Industry Creation Hatchery Center, Tohoku University with government support by the Ministry of Economy, Trade, and Industry and from NEDO (New Energy and Industrial Technology Development Organization).

ZEOMAC™ will be manufactured at ZEON's Takaoka Plant, and the Semi-Conductors Specialty Materials Division started marketing the product in October 2004. Sales of ¥5 billion are expected for fiscal 2007.

It is essential to lower the dielectric constant of insulation film in order to miniaturize, increase the speed, and lower the power consumption of semiconductor devices. Whilst many experiments are being conducted on porous materials that have air with a low dielectric constant inside the film, these materials have disadvantages, such as low mechanical strength with poor adhesion. On the contrary, the new material that ZEON has developed is not porous, but high-density film material created by a CVD (Chemical Vapor Deposition) process using a fluorocarbon compound. For that reason, it is possible to create low dielectric constant film featuring excellent mechanical strength with close adhesion. The new technology enables processing of ultra-minute line widths of 65 nm, 45 nm, or 32 nm, which were previously believed to be difficult to attain. Also, since the ozone depletion potential is "0"(zero) and atmospheric lifespan is 0.98 year, both of which mark great progress, the contribution to global warming is low. ZEOMAC™ is thus ecologically sound material.

According to the roadmap for semiconductors, small-scale manufacture of semiconductors with line widths of 65 nm will start from 2005, and full-scale mass production will start in 2007. ZEON is developing Low-k materials with an extremely low dielectric constant of under 2.0 and intends to pursue further R&D in this field.

Supplementary Explanation

1. Microwave-excited high-density plasma device

This device generates plasma by using microwaves. The plasma gives rise to polymerization of chemical

substances, for example, circular C5F8. The polymerized substance created in this reaction is formed into film.

2. CVD (Chemical Vapor Deposition)

Accumulates the polymerized substance created by plasma in a gas flow.



For further information

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