

DEVELOPING LOW-TEMPERATURE DEFECT PASSIVATION TECHNOLOGY WITH SUPERCRITICAL FLUID TECHNOLOGY

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Current technology nodes in the process of semiconductor manufacturing have faced many bottlenecks. Therefore, a disruptive-innovative semiconductor processing technology is crucially needed to make a significant breakthrough. Our research team has developed a low temperature (RT~250°C), defect passivation technology based on the supercritical fluid (SCF) technology applied in the nano-scale device processing to overcome the key issues. The SCF technology was originally applied in the field of the extraction and the cleaning of biotechnologies. However, our research team firstly applies this technology in the optoelectronic device. Compared to current high pressure annealing (HPA) and rapid thermal annealing (RTA) methods, the SCF-based defect passivation technology features low temperature, and can be applied for various materials and devices including photoelectric device, advanced nano-device, memory device, and wide bandgap device. Currently, the prototype of the 12" supercritical fluid processing equipment has already been built, and related recipes including nitridation, oxidation, hydrogenation, and sulfurization are also implemented for various devices and applications. In this talk, we will introduce related SCF defect passivation technology and future developments for the SCF applications.