

Gas phase diagnostics of high-density SiH₄/H₂ microwave plasma

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As a new plasma source for the plasma enhanced chemical vapor deposition (PCVD) of $\mu\text{-Si}$ deposition, we have demonstrated a microwave-excited plasma source, which can produce high density ($\sim 10^{12} \text{ cm}^{-3}$) plasma with low electron temperature ($\sim 1 \text{ eV}$) and low plasma potential ($\sim 10 \text{ V}$). In this plasma source, microwave power radiated from slot antenna is distributed along the plasma-dielectric interface in large area and this enables us to produce uniform high-density plasma in large area. To optimize deposition conditions, deep understanding of gas phase chemistry is indispensable. In this presentation, we will discuss on the gas phase diagnostics of microwave SiH₄/H₂ plasma such as SiH₄ dissociation or SiH₃ radical profile as well as deposited film properties.