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Effects of electrode structure on characteristics of multi-hollow discharges[1] YOSHIHIRO TORIGOE, KIMITAKA KEYA, SUSUMU TOKO, HYUNWOONG SEO, HAHO ITAGAKI, KAZUNORI KOGA, MASAHARU SHIRATANI, Faculty of Information Science and Electrical Engineering, Kyushu University — Silane plasmas are widely employed for hydrogenated amorphous silicon (a-Si:H) film deposition. Amorphous silicon nanoparticles below 10 nm in size (clusters) are formed in silane plasmas and some of them are incorporated into a-Si:H films, leading to the light induced degradation which is the most important issue for a-Si:H solar cells. To suppress cluster incorporation, a multi-hollow discharge plasma CVD method has been developed and succeeded in depositing highly stable a-Si:H films. For further improvement of the film qualities, we have employed a thicker grounded electrode to suppress plasma expansion toward the deposition region. From optical images of the discharge plasmas, the expansion was significantly suppressed using 10 mm thick grounded electrode. For the 10 mm thick electrode, optical emission intensity ratio of Si* (288 nm) and SiH* (414 nm) I_{Si*}/I_{SiH*}, which shows a ratio of cluster generation ratio and radical ones, was 20 % of that for 1mm thick electrode. These results suggest that the generation of clusters was also suppressed using the 10 mm thick grounded electrode.

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