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Cluster Incorporation Control by Hydrogen Silane Mixture in Multi Hollow Discharge Plasma CVD[1] SUSUMU TOKO, YOSHIHIRO TORIGOE, YOSHINORI KANEMITU, HUNWOONG SEO, KAZUNORI KOGA, MASAHARU SHIRATANI, Kyushu University — Light-induced degradation has been one of the most important issues for hydrogenated amorphous silicon (a-Si:H) solar cells. In SiH4 discharges employed for a-Si:H deposition, there coexist SiH3 radicals and clusters. Our previous results show that incorporation of amorphous silicon clusters is responsible for the light-induced degradation. Therefore, it is important to control the incorporation of clusters into films. We have developed multi-hollow discharge plasma CVD method, by which clusters are driven toward the downstream region and high quality a-Si:H films can be deposited in the upstream region. In this study, we report that the generation rate of clusters and the amount of clusters incorporated into films can be controlled by hydrogen silane mixture. The generation rate of clusters correlates with electron temperature, which information was obtained by the optical emission intensity ratio ISi*/ISiH*. The amount of cluster incorporation was measured with quartz crystal microbalances (QCMs) [1]. With decreasing hydrogen gas flow rate the amount of cluster incorporation decreases.

[1] Y. Kim, et. al., Jpn. J. Appl. Phys. 52 (2013) 01AD01.

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