

Abstract Submitted
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Cluster incorporation during amplitude modulated VHF discharge silane plasmas¹ SUSUMU TOKO, YEONWON KIM, YUJI HASHIMOTO, YOSHINORI KANEMITU, HYUNWOONG SEO, GIICHIRO UCHIDA, KUNIHIRO KAMATAKI, NAHO ITAGAKI, KAZUNORI KOGA, MASAHARU SHIRATANI, Kyushu University — VHF discharge silane plasmas have been widely used to deposit hydrogenated amorphous silicon (a-Si:H) films. In this plasma process, while the higher VHF power brings about the higher deposition rate, it also results in generating a lot of Si clusters, which are mainly responsible for light degradation of a-Si:H thin films. Therefore, it is important to clarify a growing process and behavior of clusters and to develop a method for suppressing cluster incorporation into films. Here we investigated effects of amplitude modulated VHF discharge silane plasmas on cluster incorporation into Si thin films by in-situ measurements with quartz crystal microbalances (QCM). Experiments were carried out in a multi-hollow discharge plasma CVD reactor with QCM [1,2]. The amount of cluster incorporation in initial phase and steady state is found to be controlled by modulation level and frequency of the amplitude modulation.

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

[2] K. Koga, et al., J. Vac. Sci. Technol. A22 (2004) 1536.

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