

Abstract Submitted
for the GEC19 Meeting of
The American Physical Society

Spatial inhomogeneous distribution of high Si-H₂ bond density in a-Si:H films deposited by MHPCVD.¹ HISAYUKI HARA, YUAN HAO, KOHEI ABE, DAISUKE YAMASHITA, KUNIHIRO KAMATAKI, NAHO ITAGAKI, KAZUNORI KOGA, MASAHARU SHIRATANI, Kyushu University — Hydrogenated amorphous silicon (a-Si:H) solar cells are promising as a power sources for IoT devices because of its flexible features and a low production cost. t Si-H₂ bond density in the films tends to correlate with light-induced degradation degree; leading to 20% reduction of efficiency. The high Si-H₂ bond density regions are located at random in the plane. That is one of the problems for industrial production. To decrease Si-H₂ bond density and to make the better film uniformity, we study the spatial distribution of Si-H₂ bond density in the plane as a parameter of substrate temperature. A-Si:H films were deposited on Si substrate by using a multi-hollow discharge plasma CVD method with a cluster-eliminating filter. Spectra of Si-H₂ bond (2090cm⁻¹) and Si-H (2000cm⁻¹) were measured by FTIR spectrometer and from their peaks the I_{SiH₂}/I_{SiH} values are obtained. The spatial aperture size was 50 um x 50 um, and a total 900 points were measured in 30 rows and 30 columns (1.5mm x 1.5mm). The average value of I_{SiH₂}/I_{SiH} decreases from 0.23 at 170° to 0.022 at 250° and its uniformity becomes better as well. I will report the results with some images of distribution of Si-H₂ bonds and the frequency distributions of Si-H₂ bonds.

¹This work was partly supported by AIST and JSPS KAKENHI Grant Number JP26246036.

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Date submitted: 02 Jun 2019

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