

Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Measurement of surface loss probabilities of hydrogen radicals in plasma-enhanced Si CVD process for solar cell YUSUKE ABE, KEIGO TAKEDA, KENJI ISHIKAWA, HIROKI KONDO, Nagoya University, MAKOTO SEKINE, MASARU HORI, Nagoya University, JST-CREST — Microcrystalline silicon (μ c-Si:H) thin films are promising materials for the bottom cell of a tandem solar cell, because they absorb light with higher wavelength towards the infrared region of solar spectrum and have excellent stability against light soaking with respect to top cell in which amorphous silicon thin films are used. It is known that hydrogen radicals play an important role in the deposition of μ c-Si:H thin films by plasma enhanced chemical vapor deposition (PECVD). Film structures of μ c-Si:H, such as crystallinity and crystal orientation, are decided by the flux ratio of hydrogen radicals to film precursors. The process margin to get a high quality μ c-Si:H thin film for solar cells is very narrow. Therefore, it is important to recognize the behavior of hydrogen radicals in plasma. However, the basic data such as a surface loss probability have not been sufficient. In this study, the surface loss probabilities of hydrogen radical on chamber walls were estimated by measuring the decay time constants of H radicals in H₂ plasma afterglow. The surface loss probability of hydrogen radicals on the stainless-steel was estimated to be 0.12. When the stainless-steel was heated to 465 K, it decreased to 0.022.

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Date submitted: 11 Jun 2010

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