

Abstract Submitted  
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**Behavior of radicals in SiH<sub>4</sub>/H<sub>2</sub> plasma for fabrication of solar cell using silicon thin film** YUSUKE ABE, ATSUSHI FUKUSHIMA, YA LU, KEIGO TAKEDA, HIROKI KONDO, KENJI ISHIKAWA, MAKOTO SEKINE, MASARU HORI, Nagoya University — Microcrystalline silicon ( $\mu c$ -Si:H) thin film grown by low temperature plasma enhanced chemical vapor deposition (PECVD) is an attractive material for applications in thin film solar cells since they can absorb higher wavelength light towards the infrared region of solar spectrum and have excellent stability against light soaking compared to amorphous silicon (a-Si:H) thin films. The flux of hydrogen (H) radicals is a determining factor of crystallinity of thin silicon films in the case of the PECVD. Therefore, it is important to recognize the behavior of H radicals in the plasma. However, the knowledge of H radicals has not been sufficient since it is difficult to measure the H radical absolute density under the actual condition to realize the high deposition rates of  $\mu c$ -Si:H. In this study, we have constructed a system of measuring the H radical absolute density in the PECVD using vacuum ultraviolet absorption spectroscopy and succeeded in the measurement. The density decreased from  $9.1 \times 10^{12} \text{ cm}^{-3}$  to  $6.0 \times 10^{12} \text{ cm}^{-3}$  with increasing SiH<sub>4</sub> flow rate. The decreasing is probably due to increasing the reaction of H radical and SiH<sub>4</sub>. Relation between film quality and radicals will be discussed.

Yusuke Abe  
Nagoya University

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