Abstract Submitted for the GEC15 Meeting of The American Physical Society

Effects of ion bombardments on electronic properties of amorphous carbon films grown by plasma-enhanced chemical vapor deposition HIROTSUGU SUGIURA, LINGYUN JIA, HIROKI KONDO, KENJI ISHIKAWA, KEIGO TAKEDA, MAKOTO SEKINE, MASARU HORI, Nagoya University, Furocho, Chikusa-ku, Nagoya 464-8603, Japan — Amorphous carbon (a-C) films show huge variety of optical and electronic properties, because of a mixture of  $sp^2$  and  $sp^3$  bonding carbon. Therefore, it's expected to apply a-C films to optical and electrical device applications, such as solar cells. However, there has been no report about a photovoltaic effect in a-C junction solar cells. Growth mechanism and relationship between plasma factors and film properties are not clarified yet. It is important to clear the effect of radicals and ions on their film properties. In this study, a-C films were synthesized by a radical-injection plasma-enhanced chemical vapor deposition at 550 degree C, in which 20 or 250 W VHF powers was applied to capacitively-coupled plasma (CCP). And, RF bias powers were applied to substrates to control the self-bias voltage ( $V_{DC}$ ).  $V_{DC}$  values were adjusted to 200, 275, and 400V, respectively. As the CCP power increased, optical emission intensity of  $C_2$ radicals increased, and G-band peaks became shaper which indicates development of graphitization. With increasing the  $V_{DC}$ , optical band gap decreased and conductivity increased. From these results, it was found that formation of  $sp^2$  bonds and modification of energy bandgap can be realized by control of ion energy.

> Hirotsugu Sugiura Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan

Date submitted: 18 Jun 2015

Electronic form version 1.4