17a-D6-11

All carbon solarcell by microwave surface wave plasma CVD

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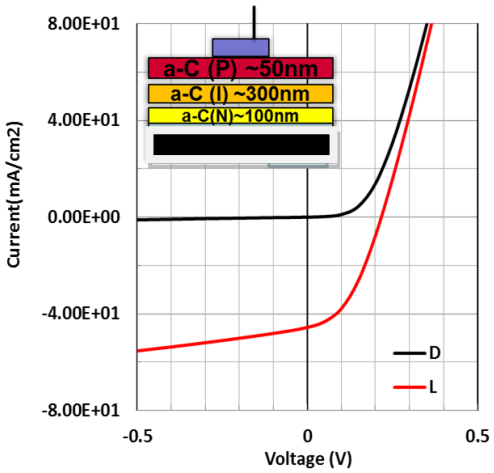
In this work, we report the electrical and photovoltaic, properties of all carbon solarcell prepared by microwave wave surface wave plasma chemical vapor deposition (MW SWP CVD). Carbon thin films were synthesized on quartz, silicon and aluminum substrates. The detail process of MW SWP CVD and substrate cleaning is described elsewhere [1-2]. Argon is used as carrier gas, acetylene is used as carbon source gas, and tri-methyl boron and phosphine were used for p and n-type carbon dopant gases. The CVD chamber was evacuated to a base pressure at about 5×10^{-4} Pa using a turbo pump. The launched microwave power was typically 1100 W and a constant gas composition pressure is maintained at 36 Pa during film preparation. For film characterization, UV/VIS/NIR spectrophotometer, high resolution transmission electron microscope (HR-TEM), Raman spectroscopy, Halls effect measurements and solar simulator were employed. The preliminary photovoltaic characteristics of the cell in n-type silicon substrate, reveals a short-circuit current density of 44 mA/cm^2, open-circuit voltage of 0.23 V, FF= 0.39 and photoelectrical conversion efficiency of 4.01%, a reproducible result. The spectral photo response characteristic of the device configuration was explained in terms of transmission/absorption characteristics of the two individual carbon layers. The detailed results and some more results of different substrate and layers discussions will be presented during the conference.



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[2] K. M. Krishna, Y. Nukaya, T. Soga, T. Jimbo and M. Umeno, Solar Energy Mater. Solar Cells 48, 163 (2001).