Synthesis of microcrystalline SiC film at low temperature (≤ 600°C) by hydrogen plasma chemical transport at sub-atmospheric pressure

HIROMASA OHMI, Department of Precision Science & Technology, Osaka University, TETSUYA MORI, TAKAHIRO HORI, HIROAKI KAKIUCHI, KIYOSHI YASUTAKE — This paper demonstrates that the µc-SiC film for solar cell application could be prepared by plasma enhanced chemical transport technique at sub-atmospheric pressure. The SiC film was synthesized by using graphite and Si solid sources. The hydrogen plasma was generated in the gap (~1mm) between the solid source and substrate at 200 Torr. The influence of the substrate temperature \( T_{\text{sub}} \) on the film properties was investigated. Based on the structural analysis, it became clear that the \( \mu \text{c-3C-SiC} \) film could be prepared at low \( T_{\text{sub}} \) (100 - 600°C). The electric conductivity of the SiC film increased with increasing \( T_{\text{sub}} \) and reached to 1.68S/cm for the SiC film prepared at 600°C. The n-type 3C-SiC film was prepared on the p-type Si to fabricate a pn diode. The current –voltage characteristic of the pn diode showed good rectifying characteristics. Furthermore, photovoltaic characteristic of the prepared diode was checked up.

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