

Studied on Characteristics of MIS Diode from Diamond Like Carbon

Y. Wongprasert, N.Atiwongsangthong, R.Muanghlua, A.rerkratn and W. Titiroongruang
*Electronics Research Center, Faculty of Engineering, King Mongkut's Institute of Technology,
Ladkrabang, Bangkok, 10520 Thailand.
Fax 662-7392384, Tel. 662-7392385
E-mail: s3060018@kmitl.ac.th*

ABSTRACT

In this paper, the characteristics of Metal / Intrinsic / Semiconductor (MIS) diode from diamond-like carbon (DLC) was studied by using three thickness of intrinsic layer (16, 20 and 40 nm) for checking type of material. The devices were fabricated in the form of Al (M)/ DLC (I)/ p-doped-silicon (S) MIS diode configurations. The 20 nm of DLC thickness was studied on physical and electrical properties. Raman spectrometer, atomic force microscopy (AFM), analyzed the physical properties of DLC. The current-voltage (I-V) characteristics were measured and analyzed to examine the transport mechanisms in the MIS junction. The investigation demonstrated that reverse leakage current was decreased effectively only when the DLC thickness was decreased, this show that DLC was semimetals property and resulting the higher breakdown voltage. The mechanism of the forward current was derived from Frenkel-Poole emission and schottky emission step for electrical pre-conduction and Schottky emission, Tunnel emission and SCLC step for electrical post-conduction.

Keywords : Diamond-like Carbon (DLC), Metal Insulator Semiconductor (MIS), Diode