

ELECTRONIC CONDUCTION PROCESSES IN AMORPHOUS SILICON-CARBON ALLOY (a-Si:C:H) THIN FILMS PREPARED BY RF MAGNETRON SPUTTERING

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ABSTRACT

Thin films of amorphous silicon-carbon alloy (a-Si:C:H) were prepared by RF magnetron sputtering onto glass substrates maintained at room temperature. Aluminium (Al) electrodes were provided by thermal evaporation to form sandwich structures. The amorphous state of the films was confirmed by XRD analysis and their constituent was checked using FT-IR System-Spectrum machine. Capacitance measurements indicate that the films have a relative permittivity value of 6.93. A detailed study of dark current-voltage (I - V) characteristics clearly reveals the conduction mechanism as ohmic at low voltages and that of trap limited space charge limited conduction (SCLC) at higher voltages. Further evidence for space-charge-limited conduction process is provided by a linear dependence of $\log I$ on $\log d$, $\log V_x$ on $\log d$ and $\log V_{TFL}$ on $\log d$. The trap density is found in the order of 10^{21} m^{-3} .

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