

ELECTRIC CONDUCTIVITY
OF NITROGEN-DOPED DIAMOND-LIKE CARBON
FILMS: II. SPACE-CHARGE-LIMITED CURRENTS

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S u m m a r y

The results of experimental investigations of the electric conductivity of nitrogen-doped diamond-like carbon (DLC) films after the thermal annealing are presented. The currents of monopolar injection limited by a volume charge in DLC films annealed at $T = 450$ °C or highly doped with nitrogen are revealed. They are caused by the appearance of deep energy levels (electron traps) in the bandgap of a film at the effusion of hydrogen and at high levels of doping with nitrogen. The concentration of energy traps and their energy position in the bandgap of DLC (a-C:H) films after the thermal annealing or the high-dose doping with nitrogen are determined. The deep energy trap concentration is in the range $(3 \times 10^{17} - 5 \times 10^{18}) \text{ cm}^{-3}$ and has a nonmonotonous dependence on the doping level with nitrogen. Energy levels are lower by (0.11–0.55) eV than the conduction band bottom. Two energy levels positioned at different depths are observed for some films.