

Epitaxial Growth of Crystalline Polyaniline on Reduced Graphene Oxide

Authors : D. Majumdar, M. Baskey, S. K. Saha

Abstract : Graphene has already been identified as a promising material for future carbon based electronics. To develop graphene technology, the fabrication of a high quality P-N junction is a great challenge. In the present work, we have described a simple and general technique to grow single crystalline polyaniline (PANI) films on graphene sheets using in situ polymerization via the oxidation-reduction of aniline monomer and graphene oxide, respectively, to fabricate a high quality P-N junction, which shows diode-like behavior with a remarkably low turn-on voltage (60 mV) and high rectification ratio (1880:1) up to a voltage of 0.2 Volt. The origin of these superior electronic properties is the preferential growth of a highly crystalline PANI film as well as lattice matching between the d-values [$\sim 2.48 \text{ \AA}$] of graphene and {120} planes of PANI.

Keywords : epitaxial growth, PANI, reduced graphene oxide, rectification ratio

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