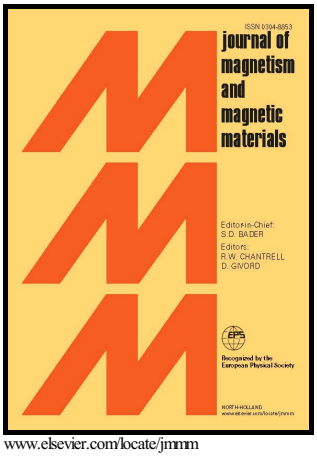

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Unusual non saturating Giant Magneto-resistance in single crystalline Bi_2Te_3 topological insulator

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Abstract

We report synthesis, structural details and electrical transport properties of topological insulator Bi_2Te_3. The single crystalline specimens of Bi_2Te_3 are obtained from high temperature (950˚C) melt and slow cooling (2˚C/hour). The resultant crystals were shiny, one piece (few cm) and of bright silver color. The Bi_2Te_3 crystal is found to be perfect with clear [00l] alignment. The powder XRD pattern being carried out on crushed crystals showed that Bi_2Te_3 crystallized in $R3\bar{m}$ symmetry with $a = b = 4.3866(2)$ Å, $c = 30.4978(13)$ Å and $\gamma = 120^0$. The Bi position is refined to (0, 0, 0.4038 (9)) at Wyckoff position 6*c* and of Te are (0, 0, 0) at Wyckoff position 3*a* and at (0, 0, 0.2039(8)) at 6*c*. Ambient pressure and low temperature (down to 2K) electrical transport measurements revealed metallic behavior. Magneto transport measurements under magnetic field showed huge non saturating magneto resistance (MR) reaching up to 250% at 2.5K and under 50KOe field. Summarily, the short communication clearly demonstrates that Bi_2Te_3 topological insulator exhibit non-saturating large positive MR at low temperature of say below 10K. The non saturating MR is seen right up to room temperature albeit with much decreased magnitude. Worth mentioning is the fact that these crystals are bulk in nature and hence the anomalous MR is clearly an intrinsic property and not due to the size effect as reported for nano-wires or thin films of the same.

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