Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Magnetoresistance of thin film devices fabricated from bulk crystal of Bi2Se3 and Bi2Te3 RYUTA YAGI, RYOJI SAKAKIBARA, FUMIYA TAHARA, JUMPEI ONISHI, DAISHI TAKEGAWA, Hiroshima University — We have studied magnetoresistance of thin flake devices of three-dimensional topological insulator, Bi_2Se_3 and Bi_2Te_3. The thin flakes were obtained by exfoliating bulk crystal mechanically, and those with thickness between 6 and 60nm were studied. We found that the behavior of the low-field magnetoresistance measured at the low temperature, could be classified into two types in terms of weak anti-localization. The class of devices showing the quantum correction was analyzed with a standard Hikami-Larkin-Nagaoka formalism. A best fit was obtained at a fitting parameter α significantly smaller than 0.5, which could be interpreted by an interaction effect between surface Dirac electrons and those in the bulk band. On the other hand, the other class of devices did not exhibit any sign of the anti-localization but exhibited parabolic magnetoresistance, although the thickness is within the same range. This is possibly due to lack of Dirac surface states because of stacking fault in the layer structure.

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Date submitted: 11 Nov 2013 Electronic form version 1.4