Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Dependence of the electronic transport on the microstructure in annealed Bi thin films THANH NHAN BUI, JEAN-PIERRE RASKIN, ELEN/ICTEAM, Universite catholique de Louvain, LOIC MALET, STEPHANE GODET, 4MAT, Universite Libre de Bruxelles, FREDERICO RODRIGUES MARTINS, SEBASTIEN FANIEL, XAVIER GONZE, DAMIEN CABOSART, BENOIT HACKENS, NAPS/IMCN, Universite catholique de Louvain — Bi thin films, with a thickness ranging from 10 to 100 nm, are deposited by electron-beam evaporation on a thermally oxidized Si(100) substrate. The deposition parameters are optimized in order to maximize the grain size of the polycrystalline films. The evolution of the crystal orientation is examined as a function of the deposition and annealing parameters, by electron back scattering diffraction. Low temperature (21 mK - 150 K) magnetoresistance measurements (up to 15 T) on polycrystalline films reveal weak anti-localization, superimposed by the classical magnetoresistance. The analysis of the weak anti-localization allows us to extract quantum transport parameters, such as the phase coherence and the spin orbit coupling time. From the evolution of the broad magnetoresistance background, we infer the evolution of electronic transport parameters: the mobility, the charge carrier concentration and the mean free path. Magneto-transport and ab initio calculations are combined in order to investigate on the controversial existence of the semimetal-semiconductor transition.

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Date submitted: 09 Nov 2012 Electronic form version 1.4