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Weak anti-localization behavior in Bi2(SeTe)3 grown on GaAs (001) substrate JOSEPH HAGMANN, JACEK FURDYNA, MALGORZATA DOBROWOLSKA, XINYU LIU, University of Notre Dame — A series of Bi2(SeTe)3 thin films were grown by molecular beam epitaxy on GaAs(001) substrates in order to obtain ternary Te-Bi-Se-Bi-Te alloys with large bulk resistivities. X-Ray diffraction data reveals many reflections from only the {003}-type lattice planes, indicative of highly directed c-axis growth of these films despite the very different crystal symmetries of the film and the substrate along the film growth direction. The X-ray data reveal that a wide spectrum of mixed Bi2(SeTe)3 alloys can be obtained by this method [1]. Our studies show that the alloy films are highly uniform, and the crystallinity is comparable to that of films grown on substrates with hexagonal surface structure. In this work, we have carried out comprehensive magneto-transport measurements on a series of Bi2(SeTe)3 thin films. We find that the conductivities of the films are strongly affected by alloy composition, and that insulating samples can be obtained at Se concentrations of ∼30%. Moreover, we observe weak anti-localization behavior in all samples, which is also composition-dependent. In order to understand diffusive transport in these topological insulator alloys, both disorder and electron-electron interaction effects are considered in our analysis. [1] X. Liu et al, J. Vac. Sci. Tech. B (submitted).

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