

Abstract Submitted  
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**Raman studies of irradiation-induced defects in thin flakes of Bi<sub>2</sub>Se<sub>3</sub> and related materials** ISAAC CHILDRES, JIFA TIAN, IRENEUSZ MIOTKOWSKI, YONG P. CHEN, Purdue University — We report a Raman spectroscopy study of exfoliated Bi<sub>2</sub>Se<sub>3</sub> flakes of various thicknesses after exposure to irradiation by lasers, electron-beam and oxygen plasma. We observe little effect of irradiations on Raman spectra of thicker (>50 nm) Bi<sub>2</sub>Se<sub>3</sub> flakes, which exhibit characteristic Raman peaks at  $\sim 130$  cm<sup>-1</sup> and  $\sim 170$  cm<sup>-1</sup> similar to bulk Bi<sub>2</sub>Se<sub>3</sub>. However, spectra from irradiated thinner (<20 nm) flakes show the appearance of an extra Raman peak ( $\sim 250$  cm<sup>-1</sup>) and attenuation and broadening of the peaks at  $\sim 130$  cm<sup>-1</sup> and  $\sim 170$  cm<sup>-1</sup>. This additional peak is not seen in flakes exposed to electron-beam irradiation and lower-power lasers. We interpret the new peak in the Raman spectra as due to irradiation-induced disorder. We also performed similar Raman studies on Bi<sub>2</sub>Te<sub>3</sub>, Sb<sub>2</sub>Se<sub>3</sub> and Sb<sub>2</sub>Te<sub>3</sub>.

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