Bismuth chalcogenides topological insulators crystals grown by optical floating zone technique

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Bismuth telluride and bismuth selenides are functional thermoelectric materials for low- and near-room temperature applications because of their low thermal conductivity and high weighted mobility [1]. In last decade, a large effort has been devoted to the study of this family of materials due to their excellent topological properties [2,3]. The development of a growth method to obtain pure materials with on-demand band gap is of utmost importance to investigate the equilibrium and out-of-equilibrium properties of low bandgap and metallic samples. For this purpose, the availability of Bi_2Se_3 samples with Sb/Te substitution can be beneficial to study the nonlinear properties of solids by high-order harmonic generation spectroscopy, allowing the tuning of the bandgap in the 200-300 meV range. In this framework, high quality single crystals of pure Bi_2Se_3 and Bi_2Te_3 as well as crystals with optimum concentrations of Sb and/or Te have been grown by optical floating zone technique in order to improve the electrical properties and/or to increase the band gap amplitude. Detailed characterization of the crystals has been systematically performed on the different sets of samples obtained, to investigate the quality of the crystals.

References

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