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Size effect in Bi2Se3 Topological Insulator micro and nanoparticles FANGZE LIU, EUGEN PANAITESCU, SWASTIK KAR, Northeastern University — 3D Topological insulators are electronic materials that have a semiconducting bulk interior but a metal-like (zero-gap) surface. We present the investigations of optical transitions in bulk and nanoscale structures of the Topological Insulator Bi_2Se_3, using optical absorption spectroscopy over a range of energies between 1.1 eV and 6.5 eV. Bi_2Se_3 micro and nanoparticles were obtained by a sequence of ultrasonication steps developed by our group for this purpose. Investigations were performed on particles of different size scales ranging from 10 microns to sub-25 nanometers. While the bulk samples demonstrated expected absorption properties, the smallest (sub-25 nm) particles showed the appearance of a number of new high-energy absorption edges. The fabrication, detailed characterization, and possible reasons for the appearance of the high-energy excitation states will be discussed within the framework of its electronic band-structure description

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