# Origin and consequences of the moiré stripe formation on the surface of $Bi_2Se_3$ topological insulator thin films and nanobelts

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Moirè patterns are generated in low dimensional materials in presence of a lattice mismatch or a twist angle between two adjacent layers. Such structural deformation gives rise to a new scale of periodicity on the material surface which leads to challenging phenomena both from theoretical and experimental point of view. Topological insulators are a new class of materials where surface states play a fundamental role on their physical properties. Because of the quantum spin Hall effect, this material presents Dirac surface states and bulk bandgap for thickness higher than 6 nm and the interesting characteristic of helicity of the surface states which locks the electron spin with the momentum direction. Therefore, the formation of moiré stripes on the surface of Topological Insulators leads by itself to unpredictable consequences on important parameters ad surface electron Fermi velocity and Dirac cone formation. Moirè patterns are observed in several Topological Insulators and their origin is ascribed to the mismatch between film and substrate lattice. Here we present experimental results, which show moirè stripes on the surface of Topological Insulator $Bi_2Se_3$, both in form of thin films and nanobelts, which cannot be ascribed to the presence of a substrate but induced by the growth mechanism. The experimental data, supported by calculations based on Density Functional Theory, show the interesting properties of the modulation of the electrical conductivity along the stripes, a result that anticipates a possible new application of this material in field as twistronics and stripetronics.