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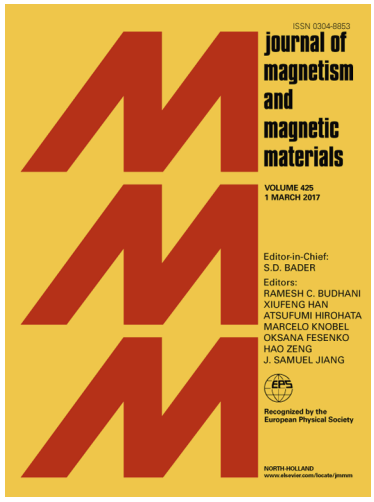

Local Magnetic Moments in the Topological Insulators

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ACCEPTED MANUSCRIPT

Local Magnetic Moments in the Topological Insulators

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We report the ESR studies of the localized magnetic moments in 3D topological insulators (TI) in order to elucidate their role in breaking of time reversal symmetry (TRS) which protects the nontrivial topology of these compounds. We studied two different types of the localized moments. The first ones are due to external doping by the magnetic ions, while the second ones are intrinsic, originating from the structural defects of TI. Using ESR spectroscopy together with the SQUID magnetometry and transport measurements we found that the impact of these two types of magnetic moments on topological insulators is different. For the case of magnetic Mn ions doped to the Bi_2Te_3 topological insulator our data reveal the specific critical behaviour confirming the ferromagnetic ordering of Mn spins even at modest doping. On the contrary if the comparable amount of local moments is induced due to intrinsic anti-site substitutional defects the analysis of experimental data evidences in favour of spin-glass state with magnetic polarization, which is completely averaged out. Therefore in the absence of external field the TRS is not violated.

Keywords: Topological insulators; magnetic moments; structural defects; spin resonance

Introduction

Topological insulators (TI) represent a class of quantum materials [1-3] which are characterized by gapless surface states with Dirac-like dispersion. Their nontrivial topology is protected by time-reversal symmetry (TRS). The breaking of this symmetry gives rise to different topological states corresponding to new quantum materials. One of the most promising ways to study the

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