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THE CORRELATION BETWEEN THE EFFECTS OF STRAIN AND STOCHIOMETRIC COEFFICIENT ON THE MAGNETIC PROPERTIES OF SrSnO3 AND Sr3SnO

by
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Abstract

This report is concerned with computational and graphical modelling of the correlation between the effects of strain and stochiometric coefficient on the magnetic properties of Perovskite SrSnO3, and Anti-perovskite Sr3SnO. Sr3SnO is one of those theoretical materials, because Sr3SnO is a dilute magnetic semiconductor, it could be used to create transistors that operate at room temperature based on magnetic fields, rather than electrical current. There are other materials that are dilute magnetic semiconductors, but researchers have struggled to integrate those materials on a silicon substrate, which is essential for their use in multifunctional, smart devices. Lately, researchers were able to synthesize this material as a single crystal on a silicon chip. Topological insulators (TIs) are an exciting class of materials with unique properties making them potentially useful in high speed, low power digital devices, quantum computing, and spintronics.

Possible applications of semiconductor spintronics include magnetic sensing and non- volatile magnetic memory.

While this is a discovery with great potential, there is still some work to do. This has prompted us to do some First principles calculations on this material together with some experiments. The key parameter is the spin of the electron, as spin can be thought of as the fundamental origin of magnetic moment. The characteristics of Integrated circuits include high speed signal processing and excellent reliability, but the memory elements are volatile (the stored information is lost when the power is switched off, i.e., DRAMs). A key advantage of magnetic memory technologies is that they are non-volatile since they employ ferromagnetic materials which by nature have remanence.

Keywords: Perovskite, Anti-perovskite, Magnetic Properties, Electric Properties Valance Band, Conduction Band, Nanoparticles.