Contribution ID: **352** Type: **Poster**

Structural properties and room temperature ferromagnetism in nanocrystalline HfO2

Tuesday, 18 September 2018 17:15 (15 minutes)

Hafnium oxide (HfO2) crystallizes in the monoclinic phase at room temperature which undergoes a phase transformation to tetragonal and cubic at 1700 oC and 2600 oC, respectively. Herein, we present a detailed structural and magnetic properties of nanocrystalline HfO2 powders synthesized by a Pechini type sol-gel method followed by calcination at 900 oC in air. X-ray diffraction and Le-Bail profile refinement revealed that HfO2 crystallized in monoclinic phase, space group, P21/c with an average particle size of ~40 nm. The lattice spacing calculated from high resolution transmission electron microscopy (TEM) micrograph and selected area electron diffraction (SAED) pattern further endorse the formation of monoclinic phase in HfO2. Magnetic measurements have shown that HfO2 exhibits a noticeable hysteresis loop manifesting ferromagnetism at room temperature in contrast to the diamagnetic behaviour in bulk. Room temperature ferromagnetism observed in nanocrystalline HfO2 has been the subject of great interest for spintronic device application. However, the origin of intrinsic ferromagnetic ordering in diamagnetic systems like HfO2 is still not clear and sought further systematic studies. In order to have a better insight, polarized neutron reflectometry (PNR) technique can be utilized efficiently for probing the magnetic properties of HfO2 thin films. PNR provides feasibility of excluding direct magnetic contributions of substrates resulting in absolute magnetic behaviour analysis with high accuracy.

Primary author: Mr KUMAR, Sandeep (Indian Institute of Technology (BHU))

Co-author: Dr RATH, Chandana (Indian Institute of Technology (BHU))

Presenter: Mr KUMAR, Sandeep (Indian Institute of Technology (BHU))

Session Classification: Poster session 2

Track Classification: P6 Nanomaterials and nanostructures