Swift heavy ion irradiation induced magnetism in magnetically frustrated BiMn2O5 thin films

Abstract
The swift heavy ion (SHI) irradiation induces weak ferrimagnetism (FM) in magnetically frustrated polycrystalline BiMn2O5 thin films. This is manifested from irradiation induced higher energetic configuration that accounts for evolution of the Mn2+ state in the Mn3+/Mn4+ network. Basically, this is the root of large magnetic moment in the irradiated samples. X-ray diffraction and Raman-scattering data of the samples indicate considerable modifications in the crystal structure after the SHI irradiation. FM in the irradiated samples and magnetically frustrated behavior of the pristine sample is apparent from dc magnetization measurements. Element specific characterizations such as near-edge x-ray absorption fine structure spectroscopy at O K and Mn L-3,L-2 edges along with x-ray magnetic circular dichroism at Mn L-3,L-2 edge show the evolution of the Mn2+ at disbursement of the Mn4+. The microscopic origin behind the induced weak FM is found to be the increased orbital moment in the irradiated thin films. (AU)