IMPROPER FERROELECTRICS AS NEW MAGNETOELECTRIC MATERIALS

ABSTRACT

A stunning magnetoelectric effect - the switching of electric polarization by magnetic field was reported in TbMnO$_3$ and TbMn$_2$O$_5$ a few years ago [1,2]. A large number of related materials has been discovered since then. It is now understood that while there is no intrinsic ferroelectric instability in these compounds, the polarization appears due to its coupling to an exotic magnetic order parameter that breaks inversion symmetry. Correspondingly, the polarization is sensitive to the field-induced magnetic phase transitions. I will discuss the possible microscopic mechanisms underlying magnetoelectric coupling in improper ferroelectrics [3] and the ways to enhance their ferroelectric properties.