Development of room temperature multiferroic PZTFT thin films

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As the characteristics of polarization and magnetism can be adopted for functional ingredients, room temperature multiferroic materials have offered an important platform for next generation electronic devices. Strong magnetoelectric coupling between these order parameters is the key point to improve the multifunctionality. Single crystalline lead iron tantalate lead zirconate titanate (PZTPFT) was found to be a new magnetoelectric multiferroic. Here, we process the growth of PZTFT thin films on $SrTiO_3$ (STO) substrate in order to obtain large magnetoelectric coupling in this new multiferroic thin film system. In this study, we investigate the correlated ferroic orders through the combination of various techniques. High resolution XRD is exploited to analyze the interfacial strain and the crystal structure. We have clearly identified the large ferroelectric response through piezoelectric Force microscopy (PFM) and P-E curve measurements. The magnetism of the sample is also measured by superconducting quantum interference device (SQUID) and x-ray magnetic circular dichroism (XMCD). All of the results suggest a novel room temperature multiferroic magnetoelectric thin film system.