Pannee Homthong 2014: Studies of Magnetoelectric Effect in TbFe-PZT Thin Film for Magnetic Recording Read Head Application. Master of Science (Physics), Major Field: Physics, Department of Physics. Thesis Advisor: Assistant Professor Pongsakorn Juntarutana, Ph.D. 92 pages.

In this thesis, magnetoelectric (ME) effect in TbFe-lead zirconate titanate thin films will be studied as function of layers thickness, an applied static magnetic field (±5 kOe), magnitude (0.25−25 Oe) and frequency (501−1251 Hz) of ac magnetic field. The tri-layer laminated $TbFe_2/Pb(Zr_{0.46}Ti_{0.54})O_3/TbFe_2$ and $TbFe_2/Pb(Zr_{0.52}Ti_{0.48})O_3/TbFe_2$ thin films were prepared by rf magnetron sputtering. The ME voltage of the samples strongly depends on thickness of the layers, applied static magnetic field, magnitude and frequency. The ME coefficient increased with increasing frequency of modulated ac magnetic field and reached a maximum at 851 Hz before falling upon a further increase the frequency. The maximum ME coefficient of 347 $V \cdot cm^{-1} \cdot Oe^{-1}$ for 20 nm-$TbFe_2$/40 nm-$Pb[Zr_{0.52}Ti_{0.48}]O_3$/20 nm-$TbFe_2$ was observed. The ME coefficient decreased with increasing thickness of the layers. Both $TbFe_2/Pb(Zr_{0.46}Ti_{0.54})O_3/TbFe_2$ and $TbFe_2/Pb(Zr_{0.52}Ti_{0.48})O_3/TbFe_2$ thin films exhibited similar bias static field dependence. A magnetic read head based on magnetoelectric effect was tested in the laboratory prototype. The TbFe-lead zirconate titanate thin films have the potential to be used as a magnetic read head.

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