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Single Phase multiferroics $\mathbf{Pb\{(Zr_{1/2}Ti_{1/2})_x(Fe_{1/2}Ta_{1/2})_{1-x}\}O_3}$ thin films DILSOM A. SANCHEZ, ASHOK KUMAR, RAM S. KATIYAR, University of Puerto Rico — The epitaxial $Pb\{(Zr_{1/2}Ti_{1/2})_{1-x}(Fe_{1/2}Ta_{1/2})_x\}O_3$ (PZTFT) (x = 0.1, 0.2, 0.3) thin films were fabricated by pulsed laser deposition. X-ray diffraction (XRD) patterns of all compositions showed single phase at room temperature without any pyrochlore phase. These materials showed good ferroelectric and ferromagnetic properties at room temperature. Room temperature multiferroicity were observed in PZTFT for x > 10%. PZTFT illustrated high dielectric constant and low loss at room temperature. The dielectric maximum temperature shifted to lower temperature side with increase in iron and tantalum concentration. Magnetization vs. applied magnetic field (M-H) curves showed well defined hysteresis with ramanent magnetization ($\sim$ 0.004- 0.13 emu/gm) and very small coercive field (900 Oe). Preliminary results indicate that PZFT is a promising candidate of room temperature multiferroic materials. AC and DC conductivity of PZTFT showed very low conductivity $\sim 10^{-9}$ to 10^{-7} S/cm^{-1} at room temperature.

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