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Ferroelectric-specific peptides as building blocks for bio-inorganic devices BRIAN REISS, GUO-REN BAI, ORLANDO AUCIELLO, LENIDAS OCOLA, MILLICENT FIRESTONE, Argonne National Laboratory — Combinatorial phage display methods have been used to identify a circularly constrained heptapeptide sequence, ISLLHST, that strongly associates with a perovskite ferroelectric, lead zirconium titanate, $Pb(Zr_xTi_{1-x})O_3$ (PZT). The affinity and selectively of binding to polycrystalline MOCVD deposited PZT thin films supported on $Si/SiO_2/Pt$ substrates were determined by titering and immunofluorescence microscopy, and the peptide was shown to selectively bind PZT in the presence of Pt, Si, Au, and several different photoresists. Ferroelectric properties were determined by measurement of the $P-E$ hysteresis loop on unmodified and phage bound PZT thin films, and no change in the coercive field, E_c, or the saturation polarization, P_s was observed after contacting the PZT with aqueous buffer or phage binding. This work represents an important first step towards rendering perovskite ferroelectrics compatible with biological molecules. Work is currently underway to study how conformational and positional control of tethered biomolecules can be controlled by the surface charge and/or polarization state of PZT as well as integration into several proto-type device architectures.

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