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Giant structural modulation & abnormal ferromagnetism in ferroelectric & ultrathin ferromagnetic digital superlattices[1] HANGWEN GUO, ZHEN WANG, MOHAMMAD SAGHAYEZHIAN, LINA CHEN, RONGYING JIN, WARD PLUMMER, JIANDI ZHANG, Louisiana State University, SHUAI DONG, Southeast University, China — The nature of magnetoelectric coupling in oxide heterostructure remains interesting but illusive, largely because the complex nature of interface intermixing and diffusion. In this work, we present our ability to fabricate superlattices consist of ferroelectric BTO & ferromagnetic LSMO, with minimum interfacial intermixing confined within half a unit cell. Such high quality superlattices with sharp interfaces allow us to explore magnetoelectric coupling effect into ultrathin region (reduced dimensionality) and observe ferroelectric induced abnormal magnetic behavior. A detailed STEM study reveals that the traditional electron/hole carrier doping scenario does not play a major role. Instead, distinct modulation of lattice displacement and octahedron tilting is responsible for the coupling effect and abnormal magnetic behavior. Our study highlights the importance of structural-property relationship in oxide heterostructures.

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