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Ferroelectricity in one unit-cell period oxide superlattices T.W. NOH, S.S.A. SEO, Research Center for Oxide Electronics & School of Physics, Seoul National University, J.H. LEE, J. YU, CSCMR and School of Physics, Seoul National University, H.N. LEE, Condensed Matter Sciences Division, Oak Ridge National Laboratory — We present electric properties of one unit-cell period superlattices composed of $CaTiO_3$(CTO), $SrTiO_3$ (STO), and $BaTiO_3$ (BTO) perovskites, in which the structural symmetry and lattice misfit strain can be systematically varied without changing the chemical valence states. The one unit-cell period CTO/BTO, BTO/STO, and CTO/STO superlattices were grown by high oxygen pressure pulsed laser deposition on atomically flat $SrRuO_3$ conducting oxide grown on STO (001) substrates. CTO/BTO and BTO/STO showed ferroelectricity in room temperature, while CTO/STO showed paraelectric behavior. Such spontaneous electric polarization was an unexpected result, because all TiO_6 octahedron was not in the same structural condition with ferroelectric BTO, but was sandwiched by CaO (SrO) and BaO layers in these superlattices. By performing first principle calculations, ferroelectric ground states can be found in the distorted TiO_6. Moreover, the ferroelectricity was described as the collective displacement of the titanium-oxygen-titanium ions, which is different from that of bulk ferroelectric material.

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