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**Phase diagram in strained epitaxial $BaTiO_3/SrTiO_3$ superlattices studied by ultraviolet Raman spectroscopy**[1] DMITRI TENNE, J.D. SCHMIDT, P. TURNER, Boise State University, A. SOUKIASSIAN, Swiss Federal Institute of Technology (EPFL), D.G. SCHLOM, Cornell University, S. NAKHMANSON, Argonne National Laboratory, X.X. XI, Y.L. LI, L.Q. CHEN, Pennsylvania State University, M. BERNHAGEN, P. REICHE, R. UECKER, Institute for Crystal Growth, Berlin, Germany, R. KATIYAR, University of Puerto Rico — Strain effect on phase transitions in nanoscale $BaTiO_3/SrTiO_3$ ferroelectric superlattices (SLs) has been studied by ultraviolet (UV) Raman scattering. A series of coherently strained $(BaTiO_3)_8/(SrTiO_3)_4$ SLs have been grown by molecular beam epitaxiy on rare earth scandate ($GdScO_3$, $DyScO_3$, $SmScO_3$, $NdScO_3$) and $SrTiO_3$ substrates. This allowed a systematic strain variation in the SLs. UV Raman data allowed the determination of the ferroelectric phase transition temperature ($T_c$) and indicated the presence of different ferroelectric phases with out-of-plane and in-plane components of polarization in SLs, depending on strain and temperature. Experimental Raman results are supported by first-principles calculations of structural instabilities in $BaTiO_3/SrTiO_3$ SLs and thermodynamic phase-field modeling of phase diagrams and ferroelectric polarization as a function of temperature and strain.

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