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Modeling the Frequency Dependence of the Complex In-plane Permittivity of Strained Ruddlesden-Popper Series Sr(n+1)Ti(n)O(3n+1) (n = 2, 3, 4, 5, 6) Phases on DyScO3 and GdScO3 N.D. ORLOFF, National Institute of Standards and Technology, C.-H. LEE, Cornell University, M.D. BIEGALSKI, Oak Ridge National Laboratory, ICHIRO TAKEUCHI, University of Maryland, D.G. SCHLOM, Cornell University, J.C. BOOTH[1] — We explore the in-plane complex relative permittivity as a function of frequency of epitaxial thin-films of the Ruddlesden-Popper series Srn+1TinO3n+1 (n = 2, 3, 4, 5, 6) grown on the rare-earth scandate substrates DyScO3 and GdScO3, which correspond to biaxial tensile strain of approximately 1.1% and 1.7%, respectively. The thin films are 50 nm on DyScO3 and 25 nm thick on GdScO3, to ensure uniform strain throughout the film. We characterize the thin films with a set of optimally designed coplanar waveguides from 45 MHz to 40 GHz and with a set of interdigitated electrodes of varying active lengths from 10 Hz to 100 MHz. We then extract the in-plane complex permittivity from 10 Hz to 40 GHz for these thin films. We report the dependence of the Curie temperature, tunability, and loss tangent on series number and strain at 1 MHz. We also present a frequency-dependent model and the corresponding fit parameters for these thin films as a function of temperature. The model assumes a distribution of domains below the Curie temperature and high frequency relaxation that we attribute to the lowest-order phonon

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