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**$T_c$ anisotropy and phase separation in strained Vanadium Dioxide films** MENGKUN LIU, MARTIN WAGNER, Department of Physics, The University of California at San Diego, La Jolla, California 92093, USA, ELSA ABREU, Department of Physics, Boston University, Boston, Massachusetts 02215, USA, SALINPORN KITTIWATANAKUL, Department of Materials Science and Engineering, University of Virginia, Charlottesville, Virginia 22904, USA, ALEXANDER MCLEOD, MICHAEL GOLDFLAM, ZHE FEI, SIYUAN DAI, MICHAEL FOGLER, Department of Physics, The University of California at San Diego, La Jolla, California 92093, USA, JIWEI LU, Department of Materials Science and Engineering, University of Virginia, Charlottesville, Virginia 22904, USA, STUART WOLF, Department of Materials Science and Engineering & Department of Physics, University of Virginia, Charlottesville, Virginia 22904, USA, RICHARD AVERITT, Department of Physics, Boston University, Boston, Massachusetts 02215, USA, D.N. BASOV, Department of Physics, The University of California at San Diego, La Jolla, California 92093, USA — We report Infrared near field study on strain induced transition temperature ($T_c$) anisotropy in vanadium dioxide ($VO_2$) films via direct visualization of a spontaneous structural and electronic phase separation. The films are epitaxially grown on $[110]_R$ or $[100]_R$ $TiO_2$ substrates and exhibit large uniaxial strain. By mapping the film topography with AFM and electronic percolation with Infrared scattering scanning near-field optical microscopy, a temperature dependent electron-lattice correlation can be clearly observed. Our work sheds a new light onto the nature of the Tc anomaly in metal-insulator transition and leads to the possibility of controlling the material's properties through strain induced phase separation.

Mengkun Liu
Department of Physics, The University of California at San Diego

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