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Spatial Inhomogeneity in Oxygen Modulated Potassium Tungsten Oxide Thin Films: implications for superconductivity and metal-insulator transitions[1] KO MUNAKATA, KATHERINE LUNA, Geballe Laboratory for Advanced Materials, Stanford University, AKIO TSUKADA, Department of Applied Physics, Tokyo University of Science, SUBHASH RISBUD, THEODORE GEBALLE, MALCOLM BEASLEY, Geballe Laboratory for Advanced Materials, Stanford University — High quality potassium tungsten oxide (K0.33 WOy) films were synthesized by pulsed laser deposition followed by annealing in vacuum. Oxygen concentration modulated anomalous correlation of metal-insulator and superconductivity transitions were studied; a similar scenario was recently suggested in the literature [1] for polycrystalline rubidium tungsten oxide samples. Detailed studies of the transport properties below and above the superconducting transition temperature exhibit a diversity of unexpected behavior. Some of our results can be interpreted as a signature of reduced dimensionality in the ab-plane in oxygen-rich insulating samples, implying a formation of spatially inhomogeneous electronic structure. We compare such phenomenology to the behavior of other materials with strong electron-phonon interactions, and discuss its implication for the possible high temperature superconducting anomaly in sodium tungsten oxides reported in the literature [2]. [1] D. C. Ling et. al., J. Phys. Conf. Ser. 150, 052141 (2009). [2] S. Reich, and Y. Tsabba, Eur. Phys. J. B 9, 1 (1999).

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