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Properties of the correlated metal phase induced by electrolyte gating of insulating vanadium dioxide nanobeams SUJAY SINGH, Department of Physics, University at Buffalo-SUNY, GREGORY HORROCKS, PETER MARLEY, SARBAJIT BANERJEE, Department of Chemistry, University at Buffalo-SUNY, G. SAMBANDAMURTHY, Department of Physics, University at Buffalo-SUNY, Buffalo, NY 14260, USA — Vanadium oxide (VO_2) undergoes a first order metal to insulator transition (MIT) and a structural phase transition (monoclinic insulator to rutile metal) near 340 K. Over the past few years, several attempts are made to trigger the MIT in VO_2 using ionic liquids (IL). Parkin's group has recently showed that IL gating leads to the creation of oxygen vacancies in VO_2 and stabilizes the metallic phase. Our goal is to study the electronic properties, changes in the stoichiometry and structure of this metallic phase created by oxygen vacancies. Electrical transport measurements on single crystal nanobeams show that the metallic phase has a higher resistance while IL gating is applied and results from Raman spectroscopy studies on any structural change during IL gating will be presented. The role of substitutional dopants (such as W, Mo) on the creation of oxygen vacancies and subsequent stabilization of metallic phase in IL gated experiments will also be discussed. The work is supported by NSF DMR 0847324 and 0847169.

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