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Nature of the metal–insulator transition in oxide interfaces MICHAEL OSOFSKY, JOSEPH PRESTIGIACOMO, SANDRA HERNNDEZ-HANGARTER, Naval Research Laboratory, ANINDYA NATH, George Mason University, VIRGINIA WHEELER, SCOTT WALTON, RACHEL MYERS-WARD, CLIFFORD KROWNE, KURT GASKILL, KONRAD BUSSMANN, KRISTIN CHARIPAR, CHRISTOPHER CHERVIN, DEBRA ROLISON, Naval Research Laboratory, MICHAEL VEIT, YURI SUZUKI, Stanford University — One of the many unusual properties of several two-dimensional (2D) oxide interface systems (e.g., $LaAlO_3/SrTiO_3$) is the presence of a metal–insulator transition (MIT). This feature contradicts the famous prediction of Abrahams, et al. that all two-dimensional systems must be insulating. Since the MIT is a quantum phase transition (one that occurs at T=0K) the transport properties should be independent of the chemical and structural details of the system. Indeed, recent work has demonstrated that a generic phase diagram for the 2D MIT can be constructed for two very different systems: 1) highly disordered RuO_2 nanoskins and 2) plasma-functionalized graphene. This phase diagram consists of three regions: metallic, weakly localized insulator with conductivity, conductivity˜logT, and strongly localized insulator. We will present details of the transport properties of the disordered RuO_2 nanoskins and plasma-functionalized graphene near their respective MITs. We will then present transport results for several gated oxide interface systems near their MITs and compare them with those for the RuO_2 nanoskins and functionalized graphene.

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