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Characterization of Diamond Surface Termination and Electrical Properties MARIELA GEORGIEVA, JAMES WEIL, A. GLEN BIRDWELL, PANKAJ SHAH, FRANK CROWNE, TONY IVANOV, U.S. Army Research Laboratory, Adelphi, MD 20783 USA — To develop diamond surfaces that exhibit better electrical properties for high-power devices, we have studied the effects of the surface termination on starting materials from two different single crystal diamond substrate suppliers. In particular, effects of the initial steps in the diamond Field Effect Transistor (FET) fabrication process on the diamond surface properties were investigated. This was accomplished by using Atomic Force Microscopy (AFM), Raman spectroscopy, and Kelvin probe microscopy, which measure the topological, chemical and structural, and electrical properties, respectively. Topography is studied through sample roughness, chemical and structural information is made available by analysis of Raman spectral features, and the electrical properties are quantified through work function values. The different diamond terminations that are compared are post-polish (as received from substrate suppliers), post-oxygenation, and post-hydrogenation.

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