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Crystallographic Orientation(s) of Vanadium Dioxide Nano-Grains on Various Single-Crystal Sapphire Substrates FELIPE RIVERA, Brigham Young University, JOYEETA NAG, RICHARD HAGLUND, Vanderbilt University, ROBERT DAVIS, RICHARD VANFLEET, Brigham Young University — Vanadium dioxide (VO_2) is a material of particular interest due to its reversible structural semiconductor to metal phase transition near room temperature ($\tilde{6}8$ °C) and its accompanied hysteresis. Electron Back-Scattered Diffraction (EBSD) was used to study the orientation of the crystalline VO_2 grains deposited on three cuts of sapphire (a-, c-, and r-cuts) by pulsed laser deposition. EBSD showed a predominant family of crystallographic relationships present in all cuts of sapphire wherein the rutile VO_2 {001} planes tend to lie parallel to the substrate's {10-10} and the rutile VO_2 {100} planes lie parallel to the substrate's {1-210} and {0001}. This family of relationships accounts for the majority of the VO_2 grains observed on all the studied sapphire substrates. However, due to the symmetry of the substrate, there were variations of these same relationships that prevent a single epitaxy from taking place in these cuts as the VO_2 grains did orient themselves with equivalent out-of plane directions in the substrate.

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