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Variable Temperature Scanning Tunneling Microscopy of WTe_2, $MoTe_2$ and alloyed $MoWTe_2$ DREW EDELBERG, DANIEL CHENET, LIOR EMBON, NATHAN ZHAO, AYELET NOTIS, ERICK ANDRADE, ABHAY PASUPATHY, Columbia Univ — The transition metal dicalcogenides MoTe2 and WTe2 grow in a Van der Waals layered structure and can be produced down to monolayer thickness. These materials exhibit multiple crystal structures with drastically differing electronic properties including semiconductor (2H) and metal (1T'). Nanoscale phase engineering has been proposed as a way to create a variety of device architectures. This phase engineering can be achieved by strain, chemical doping or alloying. Alloying in particular has been proposed as a facile technique to continuously tune the structural phase of the resultant material and thus lower the barrier for transitions between the insulating and metallic states. In this study we use variable temperature scanning tunneling microscopy to image both parent compounds MoTe2, WTe2 and alloyed crystals MoWTe2. Using dI/dV spectroscopy we determine the nature of the insulating and metallic states of both the parent compounds as well as use this technique to characterize the properties of the alloyed material.

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