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Investigation of the thermal stability of 1T'-$MoTe_2$ multilayers via Raman spectroscopy[1] IRVING P. HERMAN, DENNIS WANG, Department of Applied Physics and Applied Mathematics, Columbia University, New York, New York 10027, USA, KORI SMYSER, Department of Chemistry, Montana State University, Bozeman, Montana 59717, USA, DANIEL RHODES, ABHAY N. PASUPATHY, Department of Physics, Columbia University, New York, New York 10027, USA — The distorted octahedral (1T') form of $MoTe_2$ has garnered much interest in recent years because of its potential applications as a quantum spin hall insulator. Here we study the structural stability of 1T'-$MoTe_2$ multilayers encapsulated by hexagonal boron nitride (hBN) above room temperature by tracking the evolution of its Raman spectrum and cross-checking the results with atomic force microscopy (AFM). Our data indicate the presence of both linear and nonlinear redshifts in peak positions upon heating and, furthermore, suggest the irreversible degradation of the original compound into tellurium nanocrystals at higher temperatures. We discuss the implications of these findings for related optical and transport experiments involving this material and how encapsulation may help extend the lifetime of such devices.

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