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Investigation of the Effects of Temperature Cycling on Crystalline and Amorphous Germanium Telluride using Raman Spectroscopy A. GLEN BIRDWELL, LEONARD DE LA CRUZ¹, SAMI HAWASLI, FRANK J. CROWNE, TONY G. IVANOV, Sensors and Electron Devices Directorate, U.S. Army Research Laboratory, Adelphi, MD, USA. — Raman Spectroscopy is a powerful method for investigating the intrinsic properties of electronic materials and device structures. The technique can provide atomic-level structural, chemical, electronic, and even topological information on scales comparable to the geometries of many electronic devices. In our laboratory, we routinely use Raman imaging for characterizing RF switches based on phase change materials such as Germanium Telluride (GeTe). In this presentation, we report on the effects that initial temperature-ramping cycles have on both crystalline and amorphous GeTe starting materials, and suggest how the observed materials evolution can be used to explain phenomena observed in the early switching cycles of our RF device structures. Power-handling studies on these electronic devices reveal that such information is fundamental to understanding variations in device operation and potential failure modes.

¹Other Affiliation: Electrical and Computer Engineering Department, George Washington University, Washington DC, USA

A. Glen Birdwell U.S. Army Research Laboratory, Adelphi, MD, USA.

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