Abstract Submitted
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Resistance noise spectroscopy across the thermally and electrically driven metal-insulator transitions in VO_2 nanobeams[1] ALI ALSAQQA, COLIN KILCOYNE, SUJAY SINGH, State Univ of NY - Buffalo, GREGORY HORROCKS, PETER MARLEY, SARBAJIT BANERJEE, Texas AM University, College Station, G. SAMBANDAMURTHY, State Univ of NY - Buffalo — Vanadium dioxide (VO_2) is a strongly correlated material that exhibits a sharp thermally driven metal-insulator transition at $T_c \sim 340$ K. The transition can also be triggered by a DC voltage in the insulating phase with a threshold (V_{th}) behavior. The mechanisms behind these transitions are hotly discussed and resistance noise spectroscopy is a suitable tool to delineate different transport mechanisms in correlated systems. We present results from a systematic study of the low frequency (1 mHz $<$ f $<$ 10 Hz) noise behavior in VO_2 nanobeams across the thermally and electrically driven transitions. In the thermal transition, the power spectral density (PSD) of the resistance noise is unchanged as we approach T_c from 300 K and an abrupt drop in the magnitude is seen above T_c and it remains unchanged till 400 K. However, the noise behavior in the electrically driven case is distinctly different: as the voltage is ramped from zero, the PSD gradually increases by an order of magnitude before reaching V_{th} and an abrupt increase is seen at V_{th}. The noise magnitude decreases above V_{th}, approaching the $V = 0$ value. The individual roles of percolation, Joule heating and signatures of correlated behavior will be discussed.

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Ali Alsaqqa
State Univ of NY - Buffalo

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