MATERIALS ENGINEERING

SEMINAR

"VO2: Metal-insulator Transition and Ferroelectric Heterostructures"

By

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Purdue MSE Preliminary Exam

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ABSTRACT

Owing to the fascinating metal-insulator transition (MIT), vanadium dioxide (VO2) has attracted much attention in terms of material physics, synthesis, and device applications. VO2 undergoes an MIT showing several orders of resistivity change near room temperature at ~68°C. The phase transition that can be triggered both thermally and electrically renders VO2 thin films a promising candidate for sensors, smart windows, MEMS actuators, and computing applications, etc. However, the synthesis of high quality, phase pure VO2 thin films is extremely challenging due to the abundant stable phases vanadium and oxygen could form. This document summarizes the physical properties of VO2 and the underlying mechanisms of the MIT. Subsequently, synthesis, structural, and electrical characterizations of epitaxial and polycrystalline VO2 thin films were explored, and the influence of stoichiometry and lattice strain on the MIT properties were examined. Finally, novel VO2/ferroelectric heterostructure device concepts with intriguing performance were introduced.

Date: Monday, December 13, 2021
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Place: Virtual-https://purdue.webex.com/meet/shriram

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