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Study of Thermal properties of VO2 and multilayer VO2 thin films for application in Thermal Switches. GAOHUA ZHU, Toyota Research Institute of North America — Ultrafast nature of the phase transition near room temperature in VO_2 makes it attractive material for applications in electronics and optical devices however utilization of corresponding drastic change in thermophysical properties are rarely reported. In this study we investigate thermal and electronic properties of VO_2 thin films on various substrates across the transition temperature to seek possibility of utilizing VO_2 based thermal switches for applications in thermal devices. In addition, the interfacial heat transfer in VO_2/metal multilayer thin film is mediated by phonons at low temperature, and when temperature is elevated beyond phase transition temperature, the interface thermal conductance is mediated mainly by both phons and electrons. VO_2-multilayers approach is studied to utilize the switching interface thermal conductance in order to obtain higher thermal conductivity switch ratio than what can be achieved in intrinsic VO_2. Thermal conductivities and interface thermal conductance of VO_2 and VO_2 multilayer thin films are measured using the time-domain thermoreflectance (TDTR) method. We will discuss interplay of phononic and electronic component to thermal conductivity in the light of Wiedemann–Franz law across the metal to insulator state of VO_2 films.

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