Phase transition in vanadium dioxide

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Phase transitions (PTs) of the 1st order are progressing at significant deviation from equilibrium state, andthe medium is active in this case, i.e. it is capable to emit energy as electromagnetic and acoustic waves. Structural PT goes during a certain time when nuclei of a new phase, phase boundaries, various defects, dislocations and fractures may form in the sample. All these defects are accompanied by the formation of inhomogeneous elastic deformations. Vanadium dioxide, as a prototype of strongly correlated electron material, is the great interest in condensed matter physics as well for device applications. The interplay between strong electron correlations and lattice leads to the phase diagram of VO_2 that consists of states with distinct structures and electronic properties. The PT between these states can be driven by temperature, photo-excitation, hydrostatic pressure, uniaxial stress, or electrical gating [1]. The original experimental setup for the investigation of the sample thermal radiation and the separation of the contributions from radiation caused by the PT, and from the changes in the reflection coefficient on the frequencies of 28-32 GHz has been developed. The ability to self-radiation of electromagnetic waves from the free surface of the thin film VO_2 sample has been experimentally studied in vicinity of the PT temperatures [2].

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[2] Kamantsev A 2019 *IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology* **3** 17–24