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Single domain VO_2 single crystals exhibiting metal-insulator transition and insulator-insulator transition JOONSEOK YOON, Physics Dept., Yonsei Univ., BONGJIN MUN, Applied Physics Dept., Hanyang Univ., KAI CHEN, Advanced Light Source, LBNL & CAMP-Nano, Xi'an Jiaotong Univ., CATHERINE DEJOIE, NOBUMICHI TAMURA, MARTIN KUNZ, ZHI LIU, SUNG-KWAN MO, Advanced Light Source, LBNL, KYUNGSUN MOON, Physics Dept., Yonsei Univ., CHANGWOO PARK, Hanbat National Univ. & Advanced Nano Products, HONGLYOUL JU, Physics Dept., Yonsei Univ. — Electrical transport, optical microscopy, and synchrotron-based x-ray micro-diffraction measurements have been carried out on single domain VO_2 single crystals, exhibiting an abrupt first-order metal–insulator transition (MIT) with a high resistance ratio $\sim 10^5$ near $\sim$67 °C and a gradual insulator–insulator transition (IIT) at $\sim$48 °C. Low temperature (T< 45 °C), intermediate ($\sim$50 °C <T<$\sim$67 °C), above MIT (T>67 °C) phases were insulating monoclinic M2 with half vanadium ion dimerization, monoclinic M1 with full vanadium ion dimerization, and rutile (R) phases, respectively. In this poster, we will present unusual structural phases of M1, M2, and R of single-domain VO_2 single crystals and discuss the relationships between structures and the characteristics of the MIT of VO_2.

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