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Comparative studies of electrically driven metal insulator transition in VO_2 single crystal and thin film HONGLYOUL JU, Dept. of Phys., Yonsei Univ., Seoul, Republic of Korea, BONGJIN MUN, Dept. of Applied Physics, Hanyang University, Ansan, Republic of Korea, JOONSEOK YOON, Dept. of Phys., Yonsei Univ., Seoul, Republic of Korea, SUNG-KWAN MO, ALS, LBNL, Berkeley, USA, KAI CHEN, ALS, LBNL, Berkeley, USA; CAMP-Nano State Key Laboratory for Mechanical Behavior of Materials,Xi'an Jiaotong University, Xi'an,China, NOBUMICHI TAMURA, CATHERINE DEJOIE, MARTIN KUNZ, ZHI LIU, ALS, LBNL, Berkeley, USA, YVETTE LEE, KYUNGSUN MOON, Dept. of Phys., Yonsei Univ., Seoul, Republic of Korea, CHANGWOO PARK, Division of pplied Chemistry and Biotechnology, Hanbat National University, Daejon and Advanced Nano Products, Chungwon, Republic of Korea — Electrically driven metal-insulator transition (MIT) characteristics of VO_2 single domain crystal and thin-film were investigated by temperature and external bias voltage dependent electrical transport, optical microscopy, and synchrotron-based polychromatic x-ray micro-diffraction measurements. Our results suggest that electrically driven metallic state of VO_2 is similar to that of temperature driven metallic state. However, after the electrically driven MIT, VO_2 single crystal exhibits metallic and insulating colors on the surface of the crystals simultaneously. In addition, the origin of electrically driven MIT of crystals seems different from that of electrically driven MIT films. In this talk, we will present comparative studies of electrically driven MIT of VO_2 single crystal and thin-film, and discuss the origins of electrically driven MIT and its implications.

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