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Size effect on voltage-induced metal-insulator transition in VO₂ film grown by direct thermal oxidation method JOONSEOK YOON, GIYONG LEE, HONGLYOUL JU, Department of Physics, Yonsei University, BONGJIN MUN, Department of Physics and Photon Science, GIST, CHANG-WOO PARK, Hanbat National University and Advanced Nano Products — Metal-insulator transition (MIT) in vanadium dioxide (VO₂) can be induced by diverse stimuli such as temperature, voltage, light and pressure. Voltage induced MIT is of special interest for both scientific understanding and future applications. However, it is still under the debate whether the origin of voltage induced MIT comes from electrical breakdown or Joule heating effect. To figure out this origin, the electrically triggered MIT from the strip-line VO₂ film devices with dimensions of fixed width (W) of 100 μm and varied length (L) of 10, 20, 40, and 80 μm were investigated by temperature and external bias voltage dependent electrical transport, and optical microscopy. It was found that the magnitude of critical electric field at MIT and its temperature dependence were dependent on the length of the device. In this talk, we will present the size effect on the voltage-induced metal-insulator transition in VO₂ film grown by direct thermal oxidation method and discuss the origins of voltage driven MIT and its implications.

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