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Crystal structure change accompanying insulator-metal phase transition in VO_2 field-effect transistor DAISUKE OKUYAMA, RIKEN CEMS, MASAKI NAKANO, IMR-Tohoku Univ., SOSHI TAKESHITA, SAMUEL TARDIF, HIROYUKI OHSUMI, RIKEN SPring-8 Center, KEISUKE SHIBUYA, AIST, TAKAFUMI HATANO, RIKEN CEMS, SIMPEI ONO, CRIEPI, HIROKATSU YUMOTO, TAKAHISA KOYAMA, HARUHIKO OHASHI, JASRI, MASAKI TAKATA, RIKEN SPring-8 Center, MASASHI KAWASAKI, YOSHIHIRO IWASA, TAKAHISA ARIMA, YOSHINORI TOKURA, Univ. of Tokyo — The insulator-metal transition induced by the carrier accumulation in VO_2 field-effect transistor (FET) gated by electric double layers of ionic liquid has been extensively studied. To clarify the origin of this transition, we performed simultaneous measurements of in-situ synchrotron x-ray diffraction and resistivity on VO_2 FET at BL19LXU, SPring-8, Japan. By using micro-beam x-ray, the diffraction only on the carrier-accumulated channel of VO_2 FET can be measured. By applying a gate voltage, the VO_2 film becomes metallic. The *c*-lattice length estimated from the peak position of (0 0 2) diffraction on the channel of VO_2 film shows an increase of 1.4% at 150 K. The *c*-lattice length in the metallic state hardly depends on the temperature, which is consistent with the temperature-independent-metallic resistivity. The changes of *c*-lattice length and resistivity by a gate voltage are reversible. This structural change is quite different with those of thermally-, x-ray-, and pressure-induced metallic phases. The crystal structure with elongated *c*-lattice length is realized only in the metallic state induced by the carrier accumulation.

Daisuke Okuyama
RIKEN CEMS, Wako 351-0198, Japan

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