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Anomalous magneto-transport properties of high doped Nb:SrTiO3 epitaxial films[1] SUYOUN LEE, HYUNWOO JIN, INROK HWANG, KEUNDONG LEE, JIN-GWAN JOUNG, JINSANG KIM, Korea Inst of Science and Technology, BAEHO PARK, Konkuk University, SUNGWON YOON, BYUNG JIN SEO, The Catholic University of Korea, SUNG SEOK A. SEO, University of Kentucky — Nb-doped $SrTiO_3$ (Nb:STO) has been extensively studied not only as a conducting substrate for the epitaxial growth of perovskite oxides, but also as a promising candidate for developing oxide-based high mobility two-dimensional electron gas (2DEG) layer. However, most of the existing studies are focused on the properties of Nb:STO with low Nb concentration (mostly up to 5 at. %). In this work, we investigated the magneto-transport properties of Nb:STO films with high Nb content and found anomalous properties such as magnetic-field induced metal-insulator transition (MIT) and highly asymmetric magnetoresistance (MR). The magnetic field dependence of Hall resistance was found to be nonlinear indicating the involvement of more than two distinguished kinds of charge carriers in the transport. The measurement of DC-magnetization showed a signature of magnetic ordering at nearly the same temperature as the metal-insulator transition. We speculate that a charge-density-wave (CDW) phase induced by magnetic-field might be formed in highly doped Nb:STO films leading to the observed anomalous transport properties.

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