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Magneto-transport studies in thin film vanadium dioxide across the metal-insulator transition D. RUZMETOV, V. NARAYANAMURTI, S. RAMANATHAN, SEAS, Harvard University, Cambridge, MA, D. HEIMAN, Dept of Physics, Northeastern University, Boston, MA, B.B. CLAFLIN, SRC, Wright State University, Dayton, OH — Temperature dependent magneto-transport measurements in magnetic fields of up to 12 Tesla were performed on thin film vanadium dioxide (VO_2) across the metal-insulator transition (MIT). The Hall carrier density increases by 4 orders of magnitude at the MIT and accounts almost entirely for the resistance change. The Hall mobility varies little across the MIT and remains low. Electrons are unambiguously found to be the major carriers on both sides of the MIT. The Hall coefficient temperature dependence in the semiconducting phase can be well fitted within a single band model. Position of the Fermi level in the band gap is estimated from the fit and an unusually large effective electron mass is found. The positive magnetoresistance at room temperature is measured to be 0.09% in a 12T field. The results will be compared with single crystal data and discussed in detail. The studies are of relevance towards understanding mechanisms governing phase transition in complex oxide thin films.

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