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Investigation of M2 phase in the Metal-insulator transition in vanadium dioxide nanobeams JIANG WEI, Rice University, JAE PARK, DAVID COBDEN, ANDY JONES, SAMUEL BERWEGER, MARKUS RASCHKE, University of Washington, DAVID COBDEN TEAM, MARKUS RASCHKE TEAM — The role of M2 insulating phase in the metal-insulator transition of vanadium dioxide is still unknown largely due to the reason that the M2 phase can only be stabilized by doping or pressure. We fabricated a special nanostructure based on vanadium dioxide single-crystal nanobeams, where we can tune the system to stay at single M2 phase or move along the phase boundary among different phases (M1, M2 and rutile). We used Raman spectroscopy to observe the interconversion among the three phases. Electrical transport measurement shows that M1 and M2 insulating phases have the same thermal electronic gap, but the resistivity of M2 phase is about twice as much as M1 phase'. At the phase boundary of M2 and rutile metallic phase, the resistivity of M2 insulating phase remains constant, which strongly indicates the Mott like transition (strongly correlated electrons) nature of vanadium dioxide. Supported by Army Research Office and National Science Foundation

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