Disappearance of Metal-Insulator Transition in $Pr_{0.5}Ca_{0.5}MnO_3$ under Pressure

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Doped rare-earth manganites have attracted tremendous interests due to the discovery of a variety of electronic, magnetic, and structural transitions. In this paper, we present the magnetic and electrical properties of high quality single crystal of $Pr_{0.5}Ca_{0.5}MnO_3$ under high pressure and low temperature. It has been measured magnetic properties under pressure up to 1.5GPa by commercial SQUID magnetometer with miniature-pressure cell and electrical resistivity under pressure up to 6GPa with CuBe-CrNiAl hybrid piston-cylinder and cubic anvil. The spin reorientation temperature at 150K along c-axis increases monotonically with increasing pressure up to 0.8GPa. Above 0.8GPa, temperature variation of magnetization along c-axis suddenly changes to that along a-axis. It seems to be magnetic structure should be changed by applying pressures. The Metal-Insulator (M-I) transition around 150K is gradually disappeared by applying pressure. At 6GPa, the insulator phase at low temperature is completely disappeared. These results claim that pressure should affect the Jahn-Teller distortion, and consequently, change the physical properties of $Pr_{0.5}Ca_{0.5}MnO_3$ via the variation of Mn-O-Mn bond length and angle.