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Transport properties of $\text{Pr}_2\text{Ba}_4\text{Cu}_7\text{O}_{15-\delta}$ under high pressures

AKIYUKI MATSUSHITA, National Institute for Materials Science, SHUHEI YAMADA, Graduate School of Science and Technology, Niigata University, FUMIHIRO ISHIKAWA, Department of Physics, Niigata University, AYAKO OHMURA, ATSUKO NAKAYAMA, Center for Transdisciplinary Research, Niigata University, YUH YAMADA, Department of Physics, Niigata University — $\text{Pr}_2\text{Ba}_4\text{Cu}_7\text{O}_{15-\delta}$ (Pr247) was found to exhibit superconductivity in 2004 by introducing oxygen deficiencies.¹ Superconducting transition temperature (T_C) varies from zero to about 20 K depending on the oxygen deficiency δ . This high- T_C cuprate consists of three structural units, i.e., CuO_2 planes, CuO single chain and CuO double chains. The CuO_2 planes are insulating in this compound and therefore, the superconductivity is believed to occur in the CuO double chains. Interestingly, the electrical resistivity was found to show T^α dependence at low temperatures under high magnetic fields.² This temperature dependence is known as the characteristic property of Tomonaga-Luttinger liquid and suggests a possibility that the CuO double chains have one-dimensional property. In this study we report the pressure dependence of the transport properties for Pr247 with various oxygen deficiency δ 's.

¹Matsukawa et al., Physica C, 411,101(2004).

²Matsushita et al., Sci. Tech. Adv. Mater., 8,477(2007).

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