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Effect of impurities on the superconductivity in $PrOs_4Sb_{12}$: an NQR study

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We report a nuclear magnetic resonance (NQR) study in the superconducting filled skuterdite $Pr(Os_{1-x}Ru_x)_4Sb_{12}$ series. We find that 10% of Ru substitution for Os results in a large perturbation on the electronic state. The nuclear spin lattice relaxation rate ($1/T_1$) exhibits two components. One is quite close to that for pure $PrOs_4Sb_{12}$ in terms of both the magnitude and the temperature dependence, while the other component of T_1 is longer by one order in magnitude and shows a quite different temperature dependence than the pure compound. This is in contrast to the case of La substitution for Pr, in which the electronic state is suprisingly homogenious as judged from the single-component $1/T_1$ (Ref. [1]). The more drastic effect of Ru substitution for Os is probably responsible for the larger decrease of T_c compared to the La substitution case. The temperature dependence of $1/T_1$ below T_c will be presented and the implication on the nature of the unconventional superconductivity in $PrOs_4Sb_{12}$ will be discussed.

[1] Y. Imamura, M. Yogi, G.-q. Zheng, Y. Kitaoka, H. Sugawara, and H. Sato: p*resentation in this workshop.*