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Concomitant enhancement of spin susceptibility and pairing interaction in the reduced carrier-density regime of Li_xZrNCl superconductor YUICHI KASAHARA, TSUKASA KISHIUME, TAKUMI TAKANO, KATSUKI KOBAYASHI, YOSHIHIRO IWASA, IMR, Tohoku Univ., EIICHI MATSUOKA, HIDEYA ONODERA, Department of Physics, Tohoku Univ., YASUJIRO TAGUCHI, CMRG, ASI, RIKEN — Li-intercalated layered nitrides Li_xZrNCl are novel superconductors, in which superconductivity emerges at relatively high transition temperature $T_c \sim 12$ - 15 K with very low carrier density $\sim 10^{21}$ cm^{-3}. The pristine β-ZrNCl is a simple band insulator, and electron doping is achieved by Li intercalation. Insulator-to-superconductor (IS) transition takes place at $x \sim 0.05$ with maximum T_c value of ~ 15 K and T_c decreases with further doping, which is opposite trend to the other superconductors in doped band insulators. Here we show the results of magnetic susceptibility measurements on Li_xZrNCl with systematically controlled x. Estimated spin susceptibility χ_s is almost temperature-independent without substantial anisotropy. With decreasing x, χ_s evolves strongly, same as T_c. On the other hand, specific heat study revealed that the density of states is reduced but the pairing interaction is enhanced on the verge of IS transition. Therefore, our results may indicate that magnetic fluctuations are enhanced toward a band-insulator and that they are possibly responsible to superconductivity even in the present small carrier-density system.

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