Annealing induced doping effect in electron doped cuprate $\text{Pr}_{1-x}\text{LaCe}_x\text{CuO}_4 \pm \delta$

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In contrast to the hole-doped cases, electron-doped cuprates $\text{Ln}_{2-x}\text{Ce}_x\text{CuO}_4$, ($\text{Ln}$: rare earths) become superconductor after proper annealing which affects the oxygen content. Their normal state spin/charge dynamics also significantly depends on the heat treatment. While it is expected that oxygen deficiency and extra oxygen naturally induces electron and hole doping respectively, quantitative investigation has not been carried out so far.

In this study, we prepared single crystalline samples of $\text{Pr}_{1-x}\text{LaCe}_x\text{CuO}_4 \pm \delta$ ($x$=0.1, 0.15, 0.18) and heat treated them under various conditions. We then performed ARPES and magnetic susceptibility measurements. It is found that the Fermi surface volume depends on the annealing condition, indicating that the charge carriers is indeed introduced by annealing process. Based on the results, we evaluated effective doping and obtain the relationship between the effective doping and $T_c$. 