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ARPES study on annealing induced doping effects in electron doped cuprates DONGJOON SONG, National Institute of Advanced Industrial Science and Technology, Japan, YEONGKWAN KIM, WONSIG JUNG, YOONYOUNG KOH, WONSHIK KYUNG, GARAM HAN, BEOMYOUNG KIM, Institute Physics and Applied Physics, Yonsei university, Korea, H. EISAKI, Y. YOSHIDA, National Institute of Advanced Industrial Science and Technology, Japan, SEUNGRYONG PARK, Physics department, University of Incheon, Korea, C. KIM, Institute Physics and Applied Physics, Yonsei university, Korea — In contrast to the hole doped cases, electron doped cuprates $Ln_{2-x}Ce_xCuO_{4-\delta}$, (Ln: rare earths) become superconducting after proper annealing which affects the oxygen content. Their normal state spin and charge dynamics also significantly depend 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 $Pr_{1-x}LaCe_xCuO_{4-\delta}$ (x=0.1, 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 of the oxygen reduced x=0.1 system (T_c=25K) is comparable to that of the re-oxidized x=0.18 sample (T_c=19K), indicating that the electron carriers introduced by the Ce substitution is indeed compensated by the post-annealing (oxidation) process. Based on the results, we discuss the relationship between x, δ and T_c of the electron doped cuprate superconductors in detail.

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