Stripe order and superconductivity in the mechanical milled $La_{1.6-x}Nd_{0.4}Sr_xCuO_4$

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Mechanical milling introduces atomic disorders in the crystalline lattice. In the present study, we performed mechanical milling for $La_{1.6-x}Nd_{0.4}Sr_xCuO_4$ with various doping levels including $x \sim 1/8$, at which static stripe order appears and superconductivity is strongly suppressed.The X-ray diffraction patterns for the samples examined in the present study show that the crystallite size rapidly decreases and the lattice strain increases as the milling time increases. The superconducting transition temperature T_c for $x \sim 0.13$ is enhanced by the mechanical milling, while T_c for $x \sim 0.17$ is almost unchanged, although the magnitude of the diamagnetic signal for both doping levels are largely suppressed. These results suggest that the static stripe order can be suppressed by mechanical milling.