X-ray diffraction study of charge stripe order in La$_{1.875-x}$Ba$_{0.125-x}$Sr$_x$CuO$_4$ HIROYUKI KIMURA, IMRAM, Tohoku University, YUKIO NODA, HIDE TO GOKA, IMR, Tohoku University, MASAKI FUJITA, KAZUYOSHI YAMADA, MASAICHIRO MIZUMAKI, JASRI, SPring-8, NAOSHI IKEDA, HIROYUKI OHSUMI — The charge stripe order in La$_{1.875-x}$Ba$_{0.125-x}$Sr$_x$CuO$_4$ with $0.05 \leq x \leq 0.1$ and its relevance with high-$T_c$ superconductivity have been investigated by synchrotron X-ray diffraction. For $x = 0.05$, as temperature decreases, incommensurate superlattice peaks associated with the stripe order appear just below the structural phase transition temperature $T_{d2}$, indicating the strong relevance between the formation of the charge stripe order and the structural phase transition. However, in $x = 0.075$ and 0.09, the superlattice peaks emerge far above $T_{d2}$ as a short range correlation, indicating a precursor of charge ordering. Furthermore, temperature dependences of the superlattice peak intensity, correlation length, and incommensurability for $x = 0.05$ are different from those for $x = 0.075$ and 0.09. These results suggest that the transition process into the charge stripe order strongly correlates with the order of the structural phase transitions. A quantitative comparison of the structure factor associated with the charge order have been also made for all the samples.

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