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Report:

The proposal was addressed to study stripe structure in the CuO_2 plane of the $Bi_2Sr_2CaCu_2O_{8+d}$ (Bi2212) system by high resolution powder x-ray diffraction. The two series of $Bi_2Sr_2Ca_{1-x}Y_x(Cu_{1-y}Zn_y)_2O_{8+\delta}$ system with y=0.0 and 0.025 were selected for the work. In the system the doping concentration in the CuO_2 plane was controlled by Y doping and the diffraction patterns were colleted at several doping spanning the T_c values from 0K to the 90K. The idea of the experiment was to make a systematic study of the superstructure peaks with the doping. We could perform the measurements on several samples with x=0.00, 0.15, 0.3, 0.3125, 0.5, 0.6 with y=0.00 and 0.025, using the energy of 35 KeV (λ=0.354289Å). The measurements were made at five different temperatures in the range between 80 K and 300 K at selected doping of the Y contents.

The preliminary peak indexing was made using the four dimensional approach for incommensurate 1D modulations, considering that for each Bragg reflection the diffraction vector **H** can be written as $\mathbf{H} = h\mathbf{a}^* + k\mathbf{b}^* + l\mathbf{c}^* + m\mathbf{q_s}$, ($\mathbf{q_s} = \beta\mathbf{b}^*+(1/\gamma)\mathbf{c}^*$, γ=1). The doping dependence of the lattice parameters is shown in Fig. 1. It could be seen that the lattice

parameters hardly show any change with the Zn doping in the system. The doping of Y in the system (reducing the hole density) introduces an appreciable change in the lattice parameters as observed in earlier studies and confirmed in the present experiment. The lattice parameters show a very small temperature dependence depending on the doping concentration. The details are being analysed.

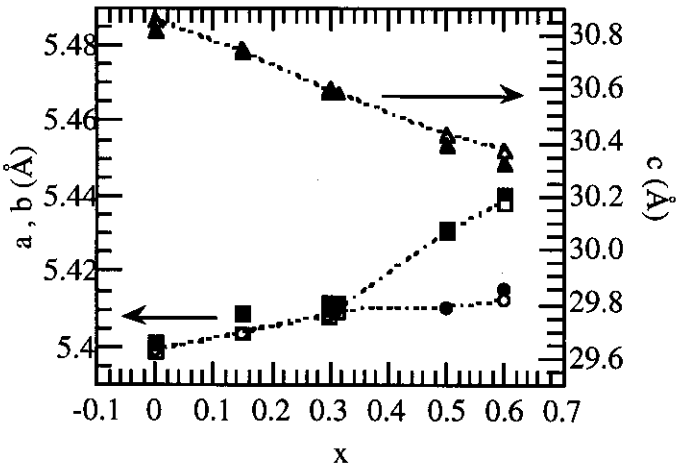

Fig. 1: Doping dependence of the lattice parameters obtained by analysis of high resolution powder x-ray diffraction patterns measured on the $Bi_2Sr_2Ca_{1-x}Y_x(Cu_{1-y}Zn_y)_2O_{8+\delta}$ system with y=0.0 (empty symbols) and 0.025 (filled symbols).

The high resolution of the diffraction allowed us to discreminate some of the superstructure peaks. The superstructure period was found to show a systematic change with doping and temperature. The doping dependence of the superstructure wavevector clearly reveals the fact that the T_c is strongly dependent of the period, being maximum at the incommensurate value of $0.21b^*$. It should be recalled that this value is found to be a universal value for all optimally doped high T_c superconductors. The results also show gradual evolution of the superstructure peak intensity which reveals an anomaly above the superconducting transition temperature of the system. The detail analysis of the superstructure and diffuse scattering peaks for different doping is underway.

In summary, we have made high resolution x-ray poder diffraction measurements on the series of Bi2212 superconducting system to study the response function of charge stripe ordering in the CuO_2 plane. The first step of the analysis has confirmed the earlier results on the evolution of the unit-cell parameters. The doping dependence of the superstructure period and intesity is to be analysed in detail before presentation. Our preliminary analysis show that the superstructure period is directly related with the superconducting transition temperature in the system.We find an anomaly above T_c, however, still to be confirmed on different samples.