

Research of Charge Fluctuations in the Electron-doped High- T_c Cuprate NCCO Revealed by ARPES and IPES

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The origin of the high- T_c superconductivity has been extensively studied so far, but the bosonic interaction to form electron pairs is still elusive. There are three degrees of freedom in the solid; orbital, charge, and spin [1]. According to the previous experimental reports [2-8], the promising candidates of the bosonic interactions are phonons and magnons. On the other hand, the role of the charge fluctuation in the high- T_c superconductivity is not well understood.

Recently, inelastic X-ray scattering experiments reported that charge excitations for both hole- and electron-doped cuprate high- T_c superconductors [9-11], and therefore, the effect of the charge fluctuation to the high- T_c superconductivity has attracted interest. According to the theoretical study [12], using the layered t - J model, the electron self-energy is calculated and discussed about the effect of charge fluctuation in the spectral function.

We have performed an ARPES and inverse photoemission spectroscopy (IPES) to observe the electronic structure in the occupied and unoccupied states, respectively, on $\text{Nd}_{1-x}\text{Ca}_x\text{CuO}_4$ ($x = 0.15$) as shown in Fig. 1. We find that a strong peak structure exists in the energy region between 5 and 9 eV above the Fermi level (E_F). In the poster presentation, we will show the details about the experimental data and discuss the effect from the charge fluctuation.

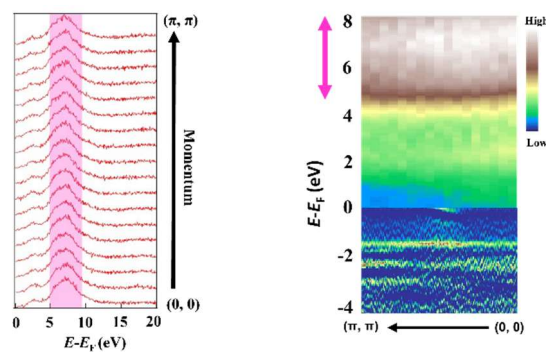


FIGURE 1. Experimental data observed by ARPES and IPES. Energy-distribution curves observed by IPES in the direction of $(0, 0)$ - (π, π) is shown on the left side. On the right side, IPES spectra without the second derivative (above E_F) and the second-derivative intensity plot observed by ARPES (below E_F) is shown.

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