Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Doping dependence study by ARPES on four layered cuprate superconductor $Ba_2Ca_3Cu_4O_8(O_\delta F_{1-\delta})_2$ YULIN CHEN, AKIRA IYO, WANLI YANG, XINGJIANG ZHOU, DONGHUI LU, HIROSHI EISAKI, THOMAS DEVEREAUX, ZAHID HUSSAIN, ZHI-XUN SHEN — An interesting phenomenon in various families of cuprate superconductors is that with the increase of the number of CuO_2 layers (which are believed to be responsible for the superconducting phenomenon) within a unit cell of the crystal, the superconducting transition temperature (T_c) increases first with the layer number n when n<=3, then decreases when n>3 and reaches the maximum at n=3. To understand this phenomenon, we investigate a four layered cuprate family $Ba_2Ca_3Cu_4O_8(O_\delta F_{1-\delta})_2$ by Angular Resolved Photoemission Spectroscopy (ARPES). We find that the electronic band structure of this four layered system exhibits clear difference from the previously studied cuprate superconductors with less layers where layers are doped uniformly when n<=2. Our doing (δ) dependence study reveals the band structure, Fermi surface and superconducting gap evolution, with insights on important microscopic process.

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Date submitted: 29 Nov 2005 Electronic form version 1.4