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Exotic electronic properties revealed in a clean CuO_2 sheet of multilayered high-T_c superconductor

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The T_c value in cuprates is sensitive to the number of CuO_2 layers per unit cell, and it is maximized in triple-layer systems. Significantly, the cuprates are categorized into two kinds according to the chemical situation of CuO_2 layers in crystal. One is single- and double-layer systems, where the CuO_2plane is adjacent to the dopant layer, which possesses random atomic vacancies, thus generally causes spatially inhomogeneous state in the underlying conduction sheet. The situation is changed in the triple and more layered systems (the second category), where inner CuO_2 planes are sandwiched by outer CuO_2 planes, thus protected from the outermost dopant layers. The cleanness in CuO_2 plane seems to get improved with increasing the number of CuO_2 plane per unit cell. In this study, we have particularly selected a five-layered system with lightly doped inner CuO_2 planes, which are ideally flat and homogeneously hole-doped, thus provide an excellent platform to unveil inhere properties of the lightly doped electronic state in cuprates. The investigation of this compound is especially significant since the electronic properties would share those of triple-layer systems, which commonly have the highest T_c in homologous series of cuprate families. I will present recent results of multilayered cuprates investigated by laser-based angle-resolved photoemission spectroscopy (laser-ARPES) with high energy and momentum resolutions.