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An intrinsic Cu-O-Cu bond-centered electronic glass with disperse $4a_0$-wide unidirectional domains in strongly underdoped $Ca_{1.88}Na_{0.12}CuO_2Cl_2$ and $Bi_2Sr_2Dy_{0.2}Ca_{0.8}Cu_2O_y$

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Hole doping into the CuO_2 charge transfer insulator alters the electronic correlations, leading to the high-T_c superconductivity (HTS). The correlation alterations are accompanied by spectral weight transfers from the high energy states of the insulator to low energies. Recently, it has been proposed [1,2] that these effects might be observable as an asymmetry of electron tunneling currents with bias voltage across the chemical potential. Atomic-scale TA-phenomena would then be of crucial importance to understand the fundamental electronic structure of the CuO_2 plane from whence the HTS emerges.

In this talk, we will report the first application of atomic resolution TA-imaging by STM, detecting virtually identical phenomena in two different lightly hole-doped cuprates: $Ca_{1.88}Na_{0.12}CuO_2Cl_2$ and $Bi_2Sr_2Dy_{0.2}Ca_{0.8}Cu_2O_y$. We find intense spatial variation primarily on planer oxygen sites. Their spatial arrangements appear to be a Cu-O-Cu bond-centered electronic glass, breaking translational symmetry of lattice and 90°-rotational symmetry. $4a_0$-wide unidirectional domains (a_0: Cu-O-Cu length) are embedded throughout this matrix and running along the both Cu-O bonds without preferred orientation. Relationship to the electronic cluster glass, the bond-centered stripe, and the high-T_c superconductivity will be discussed.

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[1] P. W. Anderson, N. P. Ong, cond-mat/0405518 & *J. Phys. Chem. Solid* **67**, 1 (2006).

[2] M. Randeria, R. Sensarma, N. Trivedi, F. -C. Zhang, *Phys. Rev. Lett.* **95**, 137001 (2005).