

Enhanced Superconductivity in Superlattices of High- T_c Cuprates

Satoshi Okamoto

Materials Science and Technology Division, ORNL

Electronic properties of multilayers of strongly-correlated models for cuprate superconductors are investigated by using the layer extensions of the cellular dynamical-mean-field theory and the dynamical cluster approximation. Particular focus is on the combinations of different doping levels, under-doped and over-doped layers which have distinct electronic properties. It is found that the superconducting order parameters in the over-doped layers are enhanced by the proximity effect of the strong pairing interaction originating from the under-doped layers. The enhanced order parameter can be even larger than the largest value of uniform systems. Such behaviors are well reproduced by calculations based on the slave-boson mean-field approximation for superlattices with t - J type interactions. Multilayers of cuprate superconductors may thus lead to higher- T_c superconductivity.