

Similar Effects of Nonmagnetic and Electrostatic Impurities on the Cu-Spin Correlation and Superconductivity in La-214 High- T_c Superconductors

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Based upon the recently suggested hole-trapping effect of Ni,^{1,2} we have investigated substitution effects of Zn as a nonmagnetic impurity and Ni as an electrostatic impurity on the Cu-spin correlation and superconductivity in $\text{La}_{2-x}\text{Sr}_x\text{Cu}_{1-y}(\text{Zn},\text{Ni})_y\text{O}_4$ from the muon-spin-relaxation and electrical-resistivity measurements.³ It has been found that the substitution of Ni for Cu suppresses the superconductivity, induces the localization of holes and develops the Cu-spin correlation *to the same degree* as the substitution of Zn for Cu in the underdoped regime, which is different from the common understanding that Zn tends to affect the dynamics of carriers as well as the Cu-spin correlation more than Ni. It has been concluded that Ni with a trapped hole tends to give rise to scattering of holes by the electrostatic potential in the CuO_2 plane *to the same degree* as Zn, which may be related to the development of the so-called dynamical stripe correlations of spins and holes.

¹Y. Tanabe *et al.*, J. Phys. Soc. Jpn. **79**, 023706 (2010).

²K. Suzuki *et al.*, Phys. Rev. B **82**, 054519 (2010).

³Y. Tanabe *et al.*, Phys. Rev. B (in press) / arXiv: 1103.1265.