Ultrafast photoinduced phase transitions in correlated electron oxides

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Strongly correlated electron systems are good targets for the exploration of ultrafast photoinduced phase transitions, because charge-transfer excitations and/or carrier injections by lights can enhance or suppress the instabilities inherent to strong electron-electron (or spin-spin) interactions and then induce drastic phase changes in sub-picosecond time scale. In this talk, we report dynamical aspects of ultrafast photoinduced phase transitions in typical correlated electron systems of transition metal oxides (cuprates and manganites) focusing on the following three topics.

(1) Photoinduced transitions from Mott-insulator to metal in the undoped layered cuprates (Nd_2CuO_4 and La_2CuO_4) [1, 2].
(2) Photoinduced transitions from antiferromagnetic charge order phase to ferromagnetic metal phase in manganites ($Gd_{0:55}Sr_{0:45}MnO_3$ and related compounds) [3-7].
(3) Ultrafast control of magnetization by photocarrier injection in manganites using heterostructures of manganites and titanates ($La_{0.9}Sr_{0.1}MnO_3/SrTiO_3$ and related systems) [8, 9].

From the results of femtosecond pump-probe spectroscopy and transient magneto-optical Kerr effect measurements, we will discuss the charge, spin, and lattice dynamics in these photoinduced transitions.

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