Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Ultrafast photo-excited dynamics in two-dimensional charge ordered systems HIROSHI HASHIMOTO, Department of Physics, Tohoku Univ., JST-CREST, HIROAKI MATSUEDA, Sendai National College of Technology, HITOSHI SEO, RIKEN, JST-CREST, SUMIO ISHIHARA, Department of Physics, Tohoku Univ., JST-CREST — Charge-order (CO) is one of the central subjects in strongly correlated electron system such as transition metal oxides and organic salts. Recently the photo-induced non-equilibrium states of the CO states have been studied in both theories and experiments intensively. The femto-second spectroscopies show a variety of exotic phenomena, for example ultra-fast insulator-metal transition accompanied by melting of CO. In order to clarify ultra-fast photo-induced phenomena in CO materials, we study theoretically a real-time dynamics of a two-dimensional spinless fermion model by using the exact-diagonalization method in finite size clusters. This is the simplest theoretical model to describe CO and its melting. We calculate the real time-dependence of the charge-correlation function and other several physical quantities. We find reduction of the charge correlation for an initial CO pattern, and emergence of the correlation for other types of COs', that is, a photo-induced CO phase transition. Transient stripe-type CO correlations strongly depend on the light polarization of the pump photon. We identify mechanism of these exotic photo-induced phenomena, and discuss its implications to other correlated electron model and real materials.

Hiroshi Hashimoto
Tohoku Univ

Date submitted: 15 Nov 2013 Electronic form version 1.4