

## Ultrafast control of optical and ferroelectric properties by terahertz fields in correlated electron materials

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Large and ultrafast responses to external electric fields as well as optical excitations are important characteristics in correlated electron materials. In this talk, we will report the following two topics about ultrafast controls of optical and ferroelectric properties by strong terahertz fields in transition metal compounds and organics.

- (1) Terahertz-field-driven sub-picosecond optical switching in one-dimensional Mott insulators of halogen-bridged nickel-chain compounds [1] and organic charge-transfer compounds via large third-order optical nonlinearity [2-4].
- (2) Ultrafast modulations of ferroelectric polarizations by terahertz fields in electronic-type organic ferroelectrics; a mixed-stack charge-transfer compound, TTF-CA [5], and charge-order compound,  $\alpha$ -(ET)<sub>2</sub>I<sub>3</sub>.

[1] H. Yada *et al.*, Appl. Phys. Lett. **102**, 091104 (2013).

[2] H. Kishida *et al.*, Nature **405**, 929 (2000).

[3] M. Ono *et al.*, Phys. Rev. B **70**, 085101 (2004).

[4] M. Ono *et al.*, Phys. Rev. Lett. **95**, 087401 (2005).

[5] T. Miyamoto *et al.*, Nature Commun. to be published.