**Ultrafast dynamics studies of ferroelectric materials**

Qian Li

Tsinghua University, Beijing 100084, China; [qianli\_mse@tsinghua.edu.cn](mailto:qianli_mse@tsinghua.edu.cn)

**Abstract:** Polarization dynamics in ferroelectric materials is intimately associated with their functional properties and has long been studied using dielectric, infrared/Raman, and inelastic neutron scattering spectroscopies. These conventional methods address the equilibrium state dynamics and have limitations in terms of probing sensitivity, temporal/spatial resolution and mode selectivity. With the development of ultrafast laser technology, ultrafast spectroscopies based on the pump-probe method have been incorporated into ferroelectric studies leading to novel and significant insights about the nonequilibrium state dynamics. In this lecture, I will give a brief introduction about the ultrafast techniques and instruments, and then discuss our recent results in the terahertz dynamics of polar topological structures as well as second harmonic generation imaging of ferroelectric materials.



**Biography:** Qian Li is currently an associate professor at the School of Materials Science and Engineering (SMSE), Tsinghua University. He graduated from the Australian National University with a Ph.D. in 2014. He then worked as a postdoctoral researcher at Oak Ridge National Laboratory and Argonne National Laboratory in USA before joining in the faculty of SMSE, Tsinghua university in Dec 2019. His research interest includes ferroelectric thin film materials and devices, semiconductor radiation detection crystals, nanoscale material property and ultrafast dynamics characterizations. He has published some 100 papers in leading journals such as *Nature*, *Science*, *Nature Communications* and *Advanced Materials*. He also serves as a youth editorial board member of *Journal of Materiomics*.