Title: Transparent conductive oxide thin film and its applications in lasers

Abstract:
Transparent conductive oxide (TCO) thin films are a form of semiconductor with both dielectric and metal properties. TCO-based materials have been extensively investigated as potential materials for application of photodetectors, sensors, solar cells, and transparent electrodes in linear optical area. In addition to their outstanding linear optical and electrical properties, TCOs have recently exhibited an interesting nonlinear optical response over a wide spectral region from ultraviolet to mid-infrared especially in the epsilon-near-zero (ENZ) region, that have been exploited in second-harmonic generation, third-harmonic generation, an ultrafast nonlinear Kerr response, and all-optical switching.
In this talk, the nonlinear optical response of the TCO film were investigated. We put forward a new idea of rippled TCO film to tailor the plasmonic mode and ENZ mode in order to get fast all-optical switch with high performance, and Q-SW laser output was demonstrated. Metallic elements doping and geometry doping were employed to tune the nonlinear response of the TCO films, which changes the mobility and loss. Optical modulators with low losses based on doping TCO thin film were designed and the performance of the modulator were simulated.

Resume: Yuanan Zhao is a Professor at Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, P R China. In 2005, he received a doctorate in Optical Engineering. He worked on laser-material interaction, laser damage testing protocol, laser damage mechanisms, metrologies for optics, TCO thin films for nonlinear optics, liquid crystal phased devices. He is leading SIOM's high-power laser-material interaction research group, and have many international collaboration projects worldwide. He has published more than 200 scientific articles and has taught several short courses on laser-material interaction and metrologies.