**Talk: Optical peoperties of choresteric liquid crystal and application for THz photonics therein**

**Abstract:**

Chiral nematic liquid crystals (Ch-LCs) are generally made of an NLC host and chiral agents and have been utilized in several optical devices, including displays, filters, and distributed feedback lasers. Typically, Ch-LCs have two stable states. One is the planar state with a periodic helical structure, whose axes are perpendicular to the cell surface; the other is the focal conic state with a multi-domain structure whose helical axes are oriented randomly throughout the cell. Each state has different optical properties that depend strongly on the pitch length and the operating wavelength. For example, the planar state exhibits Bragg reflection when the pitch is comparable with the optical wavelength. In contrast, the focal conic state weakly scatters light. The optical properties become totally different when the operating wavelength is much longer than the pitch length of the Ch-LCs, because light with a long wavelength cannot easily recognize a Ch-LCs’ helical structure. As a result, the optical rotation effects in a Ch-LCs medium are negligible and both planar and focal conic states exhibit isotropic properties in long wavelength region, indicating the potential of polarization independent THz phtonic devices. In this talk, optical properties of Ch-LCs at THz range will be introduced. Several progresses for THz photonics, such as phase shifter, high speed modulator, tunable bandpass filter, will be exhibited. In addition, prospect for high throughput liquid-crystal based THz device will be discussed as well.

**Short Bio:**

Chao-Kuei Lee received his PhD degree of Electro-Optical engineering from National Chiao Tung University, Taiwan, in 2003. Prof. Lee joined National Sun Yat-sen University (高雄中山大學) in 2004. He is currently full professor who directs the laboratory of Femtosecond & Quantum Modulation with the Department of Photonics. Now, He is conjointly appointed by Department of Physics of National Sun Yat-sen University and research center of applied science (RCAS) of academic sinica. His research interests focus on ultrafast photonics, including generating and characterizing ultrafast photonic signals with pulse shaping technique, THz Photonics, dynamic properties and applications of two dimensional materials, and nonlinear waveguide fabrication and applications for Si photonics and broadband coherent light source. Dr. Lee has published more than 60 reviewed journal papers, including five science or nature series papers, since 2011. The average citation number per paper is more than 10.