

Date: Sep. 24, 2020

**Applicant:** Masahito Oh-e (大江昌人)

**Eligibility:**

- Affiliation: Institute of Photonics Tech/EE Department, NTHU
- Research: I have been working in the field of organic optoelectronic materials and devices such as liquid crystals, organic semiconductors and displays. In the past, I worked on THz–TDS transmission measurements on liquid crystal colloids.

**Proposal Category:** C

**Team Members:** Masahito Oh-e, Ci-Ling Pan, Shang-Hua Yang

**Joint Project:** Soft-matter THz

Project Description: Advancing terahertz (THz) technology requires developing many THz-device components such as phase shifters and polarizers. This project is a joint effort to study potential applications of soft-matter materials such as liquid crystals (LCs) to THz-related components, through the studies of which we also investigate the structures and dynamics of soft-matter, which self-organizes into mesoscopic structures that are much larger than the microscopic scale and yet are much smaller than the macroscopic scale of target materials. Prof. Ci-Ling Pan will support the THz spectroscopic analysis of LC and other organic materials as well as device characterization, and advice on the physics of some of these materials as well. He is one of the pioneers in the field of THz LC optics and photonics. Prof. Shang-Hua Yang will be responsible for exploring high-speed dynamics of soft-matter interacting with THz wave. Prof. Masahito Oh-e will be responsible for conducting experiments and simulating on LC directors in LC cells. We expect this collaboration will last a few years. In the next 6-12 months, we will be establishing the basis of this collaboration.

For my part, we will simulate on the orientation of LC directors in bidirectional switching LC cells or others that have potential to achieve fast phase-shifting of THz light, through which we explore the possibilities of how to improve device characteristics such as the driving voltage and amount of phase shift for THz devices. Further, we also explore soft-matter such as cellulose for THz spectroscopy to unveil mesoscopic structures and properties.

**Budget Request:** 100k NT

**Result:** to be updated