

# High-Performance Organic Materials for Photonics and Electronics

Professor Shuji Okada

Investigation on molecules for specific functions

*Molecular design and synthesis*



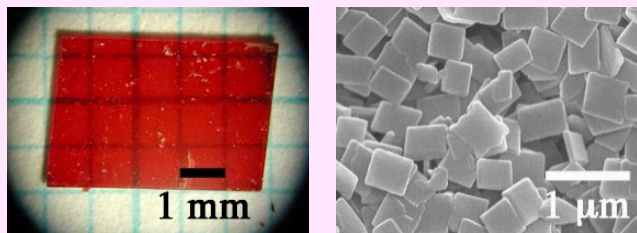
Investigation on molecular orientation in the aggregates

*Molecular orientation control  
Analyses on reactions and structures in the solid state*



Appropriate fabrication for the functional devices

*Preparation of organic crystals and polymer dispersions*



Research flow on organic materials for photonics (e.g., crystals for frequency conversion)

Content:

Our research topics include molecular designs for specific optical and electronic functions, molecular orientational control to maximize the molecular properties, and preparation of the molecular aggregates appropriate for the devices. Examples are organic ionic crystals for terahertz-wave emitters using the second-order nonlinear optical (NLO) effects or for ferroelectricity, organic multi-component crystals, high-performance electrooptic polymers for optical modulation, and  $\pi$ -conjugated polymer crystals, prepared by the solid-state polymerization, for conducting properties or for ultrafast optical switching by the third-order NLO effects.

Appealing point:

We have been performing a lot of experiments on optimization of molecular alignment in the crystals, preparation of organic crystals with the size ranging from nanometers to millimeters by improving crystal-growth conditions, dispersion of molecules and nanocrystals with appropriate orientation in polymers, and reaction and structure analyses in the solid state. These experiences can be applied for development of a various organic functional materials.

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