Shishido–Kubo Group

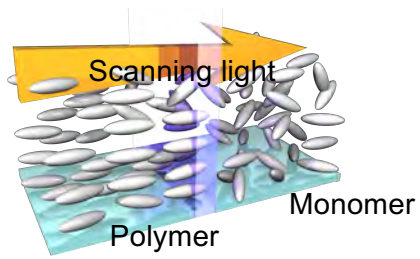
Emergence of new functions by molecular alignment control

Molecular Materials Design, Laboratory for Chemistry and Life Science

http://www.polymer.res.titech.ac.jp/english/

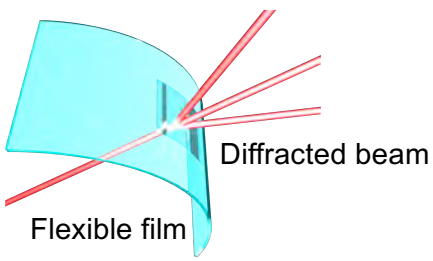
- Facile strain analysis of bending polymer films
- Dye-free alignment patterning of liquid crystals by scanning wave photopolymerization
- Laser-pointer-induced self-focusing effect in hybrid-aligned dye-doped liquid crystals

Our research program ranges from molecular design and synthesis of highly photofunctional and high-performance polymer materials to fabrication of optical devices for holographic, photomechanical, and micro-optical applications, by taking advantage of the distinct photosensitivity of the polymers. We focus on fundamental understanding of the interaction between light and polymer materials from the viewpoint of innovative photonic applications, and create photofunctional polymer materials with precisely controlled molecular alignment.



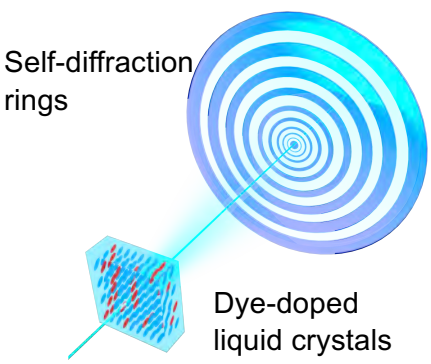
Novel molecular alignment process by photopolymerization

- Two dimensional alignment patterning over large areas with irradiation of patterned light
- Single–step fabrication of functional films with unpolarized light and non–contact process



Mechanical analysis of flexible films by means of light diffraction

- Development of a bending analysis method
- Precise analysis of bending behavior of flexible materials
- Quantitative evaluation of microscale surface strain



Light modulation material based on nonlinear optical effect

- Photoinduced molecular reorientation of polymer–stabilized dye–doped liquid crystal
- Control of light transmittance recognizing light intensity
- Development of the novel optical limiter

Anisotropic nanomaterials based on soft materials

- Orientation control of anisotropic nanomaterials accompanied with liquid–crystalline materials
- Three dimensional orientation of nanomaterials by taking advantage of molecular alignment of soft materials
- Elucidation of substantial anisotropic properties of nanorods and nanowires and their application to functional materials