

Calibration of the Frequency Response of Photodetector Using Twice-modulated Light

A system for calibrating hydrophone sensitivity by laser interferometry has been constructed at the AIST. The frequency response of the photodetector (PD) in the system is one of important factors in determination of total measurement uncertainty of the calibration. So a novel calibration technique using twice-modulated light was proposed. This technique can determine the frequency response of the PD with small uncertainty without using a standard PD or a standard modulator.

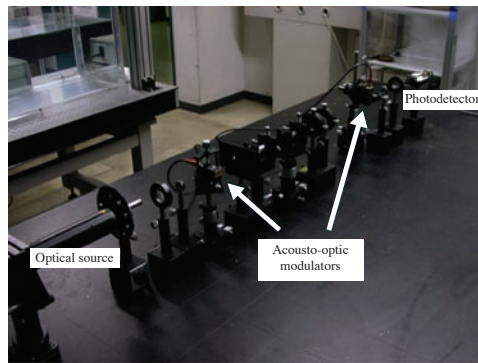


Figure 1: Photograph of the system for calibrating the frequency response of photodetector.

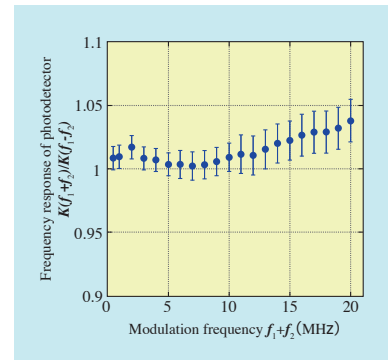


Figure 2: An example of the measured frequency response with reference to 1.5 kHz of a photodetector. The error bars show the uncertainty for each measurement.

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Photochemical manipulation of structures and properties of liquid-crystal colloids

In liquid-crystal colloids where colloidal spheres are dispersed in liquid crystals, we investigated photochemical manipulation of colloidal structures and optical properties. By modulating surface properties of colloidal spheres on the basis of photoisomerization of photochromic compounds, we achieved a control of aggregation and dispersion of the spheres. A variety of colloidal superstructures could be fabricated by illumination of appropriate patterned light onto the liquid-crystal colloids. In addition, we could manipulate light-scattering properties of the liquid-crystal colloids by photochemical modulation of phase structures of liquid crystals. It is strongly expected that the liquid-crystal colloids will be applied to practical devices in various industrial fields.

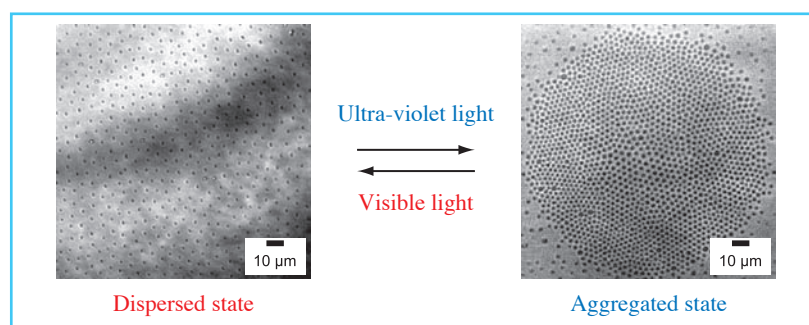


Figure: Light-induced aggregation and dispersion of micro-droplets in liquid-crystal colloids.

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