

Title	ステロイド側鎖を含むラビングしたポリイミド膜の光第二高調波発生
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Citation	
Issue Date	2017-03
Type	Thesis or Dissertation
Text version	ETD
URL	http://hdl.handle.net/10119/14254
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Abstract

I have studied the optical second harmonic generation (SHG) of a rubbed novel polyimide (PI) film having steroidal structure side chains prepared by spin coating on an indium tin oxide (ITO)-coated glass substrate. In this measurement, for the excitation light of SHG, I used the second harmonic light of Nd: YAG laser with wavelength of 532 nm, a pulse duration of 30 ps and a repetition rate of 10 Hz. The SHG intensity as a function of the rotational angle ψ of the rubbed and unrubbed PI thin films with steroidal structure side chains diamine A with input/output polarization combinations are observed. ψ is defined as zero degree when the wave vector component of the incident beam parallel to the film face is in the same to the rubbing direction. The signal of SHG from the unrubbed PI films is isotropic in the rotational angle. There was no anisotropy in the SHG patterns from the unrubbed polymer film. The characteristic anisotropic patterns are observed due to the rubbing for all the polarization combinations. By the rubbing treatment, the side chains are thought to be pulled on the surface by the nylon cloth and the main zigzag chains lying perpendicular to the rubbing direction are pulled in the rubbing direction. The second order nonlinear susceptibility $\chi_{ijk}^{(2)}$ elements were obtained from the fitting of the SHG intensity patterns. The symmetry of the polymer chains is C_s symmetry with the rubbing direction parallel to the mirror plane. The average polar (tilt) angle of the rubbed PI chains was determined to be around 16° by using the measured $\chi_{ijk}^{(2)}$ elements in the complex plane.

Keywords: Second harmonic generation, Liquid crystal displays, Polyimide, Rubbing treatment, Steroidal structure.