정확한 이차 비선형 계수측정을 위한 HRS 방법의 개발 및 이를 이용한 유기 비선형 분자의 비선형성 연구

Study on the Nonlinear Optical Properties of Organic NLO Materials by using an Improved HRS Method

송남웅, 강태임*, 이인수**, 김동호, 전승준*, 조봉래*, 정영근**
한국표준과학연구원 분광연구그룹, 고려대학교 화학과, 서울대학교 화학과

It has been a major problem that there exists a contribution of the fluorescence in the measurement of first-order hyperpolarizability (β) of organic nonlinear optical (NLO) materials in solution by using hyper-Rayleigh scattering (HRS) method[1]. This is a result of multiphoton absorption of excitation laser pulses (usually 1064 nm output of Nd:YAG laser) by organic materials and gives an overestimated value of the second harmonic generation coefficient. For the weak fluorescing material, it is possible to calibrate the fluorescence contribution by considering the fraction of HRS signal relative to the fluorescence[2], however, it has still been difficult to measure the hyperpolarizability of highly fluorescing materials or NLO materials that have large absorptions at the wavelength of HRS signal. So we developed a *new* method employing a 1560 nm laser pulse which is D_2 gas Raman laser output seeded by 1064 nm pulse from Q-switched Nd:YAG laser. This method is almost free from re-absorption of HRS signal by samples or the fluorescence contribution resulting from two-photon absorption.

In the present work, we have synthesized some organometalic and organic NLO compounds with changing the electron donor, acceptor and conjugate bridge, and measured their hyperpolarizability (β) values by using HRS method with 1064 nm or 1560 nm laser pulse excitation. The effect of donor/acceptor strengths and structure of conjugate bridge on the nonlinear optical properties of NLO materials will be discussed based on the measured β values.

[참고문헌]

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