1.3 Molecular Hyperpolarizabilities of Hydrazone Derivatives

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In organic materials, the macroscopically observed nonlinear optical and electro-optical effects can be described as originating from the nonlinear optical properties of their constituent molecules. The basic quantity describing the second-order molecular nonlinearity is called the molecular *hyperpolarizability* β. Its determination is of fundamental interest for the development of optimized nonlinear optical materials.

The molecular hyperpolarizabilities for a series of newly synthesized hydrazone derivatives were determined with two different experimental methods. The first method is *Electric Field Induced Second Harmonic Generation* (EFISH), which has become the standard method for the determination of molecular hyperpolarizabilities. With this method the dissolved nonlinear optical chromophores are oriented by applying a static electric field. This allows the coherent generation of frequency doubled light, whose intensity is measured. The second technique applied is called *Hyper–Rayleigh Scattering* (HRS). With this technique the scattered light from a solution of the material under investigation is observed. Due to orientational fluctuations, part of the scattered light is frequency doubled. The intensity of this incoherent second harmonic generation is measured and compared with the intensity obtained with a reference solution.

Both methods revealed consistently that the hydrazone derivatives show large nonlinear optical effects and are thus very interesting for electro-optic applications.