

HOLOGRAPHIC RECORDING OF SURFACE RELIEF GRATINGS IN STILBENE AZOBENZENE DERIVATIVES AT 633 NM

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Holographic recording in stilbene azobenzene derivatives by a He-Ne 633 nm laser light has been experimentally studied. It was found for the first time to our knowledge that surface relief gratings (SRG) can be recorded in organic materials also by a red light. Usually ultraviolet, violet or blue light is used which is necessary to induce the *trans-cis* photoisomerization [1]. SRG with the 2 μm period and with the amplitude of 130 nm have been recorded by 0.88 W/cm² light in about 20 minutes in 3-(4-(bis(2-(trityloxy)ethyl)amino)phenyl)acrylonitrile amorphous films spin-coated onto glass substrates. The self-diffraction efficiency up to 4.74% and the specific recording energy down to 224 J/(cm²%) were measured. The recorded SRG were stable as was proved by subsequent AFM measurements. All the measurements have been carried out at room temperature. The photoinduced changes of absorption spectra did not reveal noticeable signs of *trans-cis* transformations. Rather, the spectrally uniform bleaching of the films took place. The conclusion is made that a photothermal destruction of chromophores is responsible for the SRG recording. The recording of stable SRG in studied stilbene azobenzene derivatives is accompanied by the recording of relaxing amplitude-phase gratings due to the periodical spatial modulation of refractive and absorption indices. It should be also noted that holographic recording efficiency in stilbene azobenzene derivatives exhibit unusual nonmonotonic time dependence. The possible mechanisms of this behaviour will be discussed.

[1] Z.Sekkat, W.Knoll. Photoreactive Organic Thin Films. Elsevier Science, Orlando, Florida, 2002, 559 p.