

Accepted Manuscript

Liquid crystal light valve with a semiconductor substrate for dynamic holography in the infrared

Konstantin Shcherbin, Igor Gvozдовskyy, Dean R. Evans



PII: S0167-7322(17)34560-9

DOI: <https://doi.org/10.1016/j.molliq.2017.12.073>

Reference: MOLLIQ 8369

To appear in: *Journal of Molecular Liquids*

Received date: 28 September 2017

Revised date: 10 November 2017

Accepted date: 14 December 2017

Please cite this article as: Konstantin Shcherbin, Igor Gvozдовskyy, Dean R. Evans , Liquid crystal light valve with a semiconductor substrate for dynamic holography in the infrared. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), <https://doi.org/10.1016/j.molliq.2017.12.073>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Liquid crystal light valve with a semiconductor substrate for dynamic holography in the infrared

Konstantin Shcherbin^{1,*}, Igor Gvozдовskyy¹, and Dean R. Evans²

¹Institute of Physics, National Academy of Sciences, Prospekt Nauki 46, 03680 Kiev, Ukraine

²Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright-Patterson Air Force Base, OH 45433, USA

*corresponding author, e-mail: kshcherb@iop.kiev.ua

Abstract

Recording of dynamic holograms in the near infrared spectral range is reported for a liquid crystal light valve with a GaAs semi-insulating substrate. The interaction of weak signal and strong pump waves are studied. It is demonstrated that an out-of-phase local dynamic grating is recorded. Optimal amplitude and frequency of the applied voltage are found for maximum amplification of the weak beam. Step-like external phase modulation of the signal wave with amplitude $\pi/2$ is used to change the type of response from local to nonlocal and to achieve in such a way additional transient signal beam amplification. Study of the cells with different thicknesses of the liquid crystal layer at different grating spacings allows a seventeen-fold gain of the weak beam in the device with the thickest liquid crystal layer of 16 μm at a grating period of 1000 μm (the largest possible in our set-up). The amplitude of the refractive index modulation and nonlinear coupling constant n_2 are estimated from the experimental results.

Keywords: liquid crystals; liquid crystal light valves; spatial light modulators; dynamic gratings; nonlinear optics.

1. Introduction

Download English Version:

<https://daneshyari.com/en/article/11015899>

Download Persian Version:

<https://daneshyari.com/article/11015899>

[Daneshyari.com](https://daneshyari.com)