STUDY OF DIFFUSION PROCESS IN SUCROSE SOLUTION BY USING DOUBLE EXPOSURE HOLOGRAPHIC INTERFEROMETRY (DEHI)

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Holography is an interference method of recording the light waves diffracted by a subject illuminated with coherent light. Holographic interferometry is the most important and revolutionary application of holography. It is an extension of interferometric measurement technique in which at least one of the waves, which interfere, is reconstructured by hologram. It is concerned with the formation and interpretation of fringe patterns, which appear when a wave generated at some earlier time and stored in a hologram is later reconstructed by interfering with a comparison wave. The paper describes the use of holography in chemistry to study transport phenomena in transparent liquids. Diffusion is the movement of molecules due to their thermal energy under the influence of concentration gradient. we have employed DELHI technique for determining diffusion coefficient of 0.5 N sucrose solution. This technique resulted in producing good contrast fringes which are superior than reported earlier. The experimental results are compared with existing diffusion coefficient values and it is observed that there is good agreement with existing data.

Keywords: Diffusion, Diffusion coefficient, Double exposure holographic Interferometry, Interferogram.

CHARACTERIZATION OF UNIFORM AND SAMPLED FIBER BRAGG GRATINGS

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In this paper, multilayer structure analysis method and transfer matrix method derived from the coupled-mode theory is used for characterization of uniform fiber Bragg grating. Reflection coefficient of uniform fiber Bragg grating obtained from the multilayer structure analysis is compared with accurate method such as Transmission Line Modeling method (TLM). We also compare the different analytical transfer matrices described by the different authors in literature with multilayer structure analysis method. We characterize the reflective spectra by analyzing the effects of various normally distributed non-uniformities of sampled fiber Bragg grating.

STRUCTURE AND OPTICAL PROPERTIES OF STRONTIUM LANTHANUM TITANATE CERAMIC PEROVSKITS (SLT)

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Ceramic samples of a complex perovskite strontium lanthanum titanate $Sr_{(1-x)}La_xTiO_3$ (SLT) system with (x=0.05, 0.1 and 0.2) were prepared by mechanical mixing of their oxides ($SrTiO_3$ and $LaTiO_3$). X-ray diffraction studies on these ceramics show perovskite structure with cubic phase, its lattice constant was found to be composition dependent.

The refractive index n was determined for the investigated samples using spectrophotometeric measurements of the reflectance R, at normal incidence in the spectral range of 190 – 2500 nm at room temperature. The values of n were found to be dependent on the La content. The spectral dependence of the refractive index n, exhibits a shoulder at λ_c and it shifted towered short wavelength as the La content increased. The values of the dispersion energy E_d, the oscillator energy E_o, the lattice dielectric constant $\in_L$ and the dielecric constant at infinity frequency $\in_\infty$ have been determined. The different between the values of $\in_L$ and $\in_\infty$ indicates that there is free careier contribution in polarization with very small concentration. The effect of the La content on the obtained structure and optical constants has been discussed.

Key Words: structure/optical constants/ceramics/perovskite/(Sr, La)TiO_3

RAMAN AMPLIFICATION OF PICOSECOND OPTICAL PULSE IN ULTRA-SMALL SILICON-ON-INSULATOR WAVEGUIDE

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The stimulated Raman amplification of picosecond Stokes pulse is numerically investigated in ultra-small silicon-on-insulator (SOI) optical waveguide. Numerical results show that we obtain the gain of up to 30-dB for weak Stokes pulse in the co-propagation configuration for 10-mm-long waveguide using high intensity pump optical pulse. The peak gain, pulse width, rise time, and fall time of Stokes pulse will experience the variation course of decaying then increasing with increasing waveguide length. The time delay of output Stokes pulse is controlled by adjusting the initial time delay of both pump and Stokes pulses. The properties of Stokdes pulse spectrum depend strongly on the waveguide length, pump intensity, and time delay.

Key Words: integrated optics, silicon-on-insulator, Raman amplification.