OPTICA APPLICATA

OPTICA APPLICATA

Vol. XXXIII (2003) No. 1

PL ISSN 0078-5466
Index 367729

A joint publication of the

INSTITUTE OF PHYSICS
WROCŁAW UNIVERSITY
OF TECHNOLOGY
POLAND

&

SPIE/POLAND CHAPTER
in association with
SPIE – THE INTERNATIONAL SOCIETY
FOR OPTICAL ENGINEERING

Contents

Special glasses

Optical fibres

Uniaxial crystals

Editorial

The *6th Seminar Porous Glasses – Special Glasses PGL, 2002* was held in Szklarska Poręba, Poland on September 22–26, 2002. The Seminar was organized by the Institute of Physics, Wrocław University of Technology and Polish Ceramic Society.

The Seminar was a continuation of the series that began in Karpacz, Poland (1992) during which recent problems concerning porous glasses and special glasses were discussed. The Seminar concentrated on the technology, structure, electrical and optical properties as well as application of these materials. The papers submitted to PGL 2002 represent different sectors of the glass world: universities, research institutes; many papers were prepared jointly by research centers from different countries.

The scientific program of the Seminar included oral and poster presentations. About forty works were presented by scientists from Belgium, Russia, Israel, Ukraine and Poland.

This special issue of *Optica Applicata* contains 23 papers presented at the

6th Seminar Porous Glasses-Special Glasses, PGL 2002

The papers have been grouped under the following headings: *porous glasses* and *special glasses*.

The results of investigations into the technology, structural properties and application of porous glass in optics, microelectronics and medicine are given in the first section. The glasses have been prepared from phase separated glasses and by sol -gel method.

The part concerning *porous glasses* produced from phase separated glasses included a new perspective method (annihilation lifetime spectroscopy) for investigations of pores sizes. Studies of the adsorption process and surface active centers in porous glasses before and after introducing different substances into the pores have been performed using IR spectroscopy. Several papers focused on the optical properties of porous glasses. The optical characteristics such as dispersion of refractive index and absorption coefficient have been determined for these glasses. Changes in transmission and thermal properties of porous glasses after heat treatment

have been presented. A model explaining changes of photoluminescent properties following γ irradiation has been developed. It has been shown that the photoluminescence method can be applied in investigation of effusion process from porous glass.

The papers presented in the second part of this section have been mainly devoted to investigations of technology and structure of porous glasses obtained by sol-gel technology. Densification process of nitrided aerogels was simulated by computer modeling using classical molecular dynamics (MD). The MD simulations have shown that densification process proceeds in the same way as observed in the experiments. Typical methods: adsorption-desorption isotherms, UV-VIS-IR spectroscopy, SEM, XRD for determining glass structure have been applied for porous glasses with PbS semiconductors nanoparticles and bioactive glass films. It has been shown that ellipsometric porosimetry can be useful in characterization of diffusion barrier integrity deposited on porous glasses which are applied in microelectronics as inter -metal dielectrics with low dielectric constant. The methods based on statistical pattern recognition have been used for the evaluation of microscopic images of so-gel matrices. For determining the sign and mobility of ions responsible for electrical conductivity inside porous xerogels the dynamic current-voltage characteristics have been applied.

The second section has been devoted to *special glasses*. The analysis of EXAFS, XDR, AFM and DCS, as well as optical absorption measurements has been proposed for investigation of the structure of germanate and InF_3-based glasses. Photoelectron spectroscopy, UV-VIS spectroscopy, XPS and SEM technique have on the contrary been applied for characterization of tin oxide thin films. Investigations of the physico-chemical and mechanical properties of boron-alumina-silicate system with addition of submicrostalline sintered alumina have also been presented. The mechanism of transformation of the structure of glass into the structure compound crystallizing in it has recently been within the focus of interest of some scientists. Diffusion coefficient and lithium mobility in lithium phosphate glass with high ionic conductivity have been defined using ac, dc and SIMS method. New information on glass colouring due to silver diffusion in glass exchange of sodium on silver ions has been obtained.

I hope that scientific sessions and informal discussions created new ideas for new projects in our special field of interest.

The Organizers thank the Polish Committee for Scientific Research (KBN) and Wrocław University of Technology for financial support.

For the Organizing Committee
Dr. Ewa Rysiakiewicz-Pasek
Guest Editor