

Contents

PREFACE	xi
ACKNOWLEDGMENTS	xiii
MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS	xiv

PART I: DEFECTS

RADIATION-HARDENED OPTICAL FIBERS FOR HIGH DOSAGE SPACE APPLICATIONS	3
A.E. Miller, M.F. Yan, H.A. Watson, and K.T. Nelson	
RADIATION RESPONSE OF PURE SILICA CORE OPTICAL FIBERS. IV	9
Bolesh Skutnik, H. Henschel, O. Köhn, and H.U. Schmidt	
HYDROXYL FORMATION IN SILICA TUBES AND LAYERS DUE TO OXY-HYDROGEN FLAMES	15
J. Kirchhof and G. Braun	
OPTICAL PROPERTIES OF SILICA GLASSES HAVING O ₂ AND Cl ₂ MOLECULES	21
Koichi Awazu, Hiroshi Kawazoe, and Ken-ichi Muta	
OPTICAL PROPERTIES OF SOOT REMELTED SILICA IRRADIATED WITH EXCIMER LASERS	27
Yasutaka Matsumoto, Nobu Kuzuu, and Masataka Murahara	
EXCIMER LASER INDUCED 5.8 eV ABSORPTION AND 1.9 eV EMISSION BANDS IN FUSED SILICAS	33
Nobu Kuzuu, Yasutaka Matsumoto, and Masataka Murahara	
MATERIALS EFFECTS ON THE RADIATION SENSITIVITY OF SINGLE MODE OPTICAL FIBERS, II	39
E.J. Friebele, C.G. Askins, M.A. Putnam, C.C. Harrington, M.E. Gingerich, and W.H. Schmidt	

PART II: PHOTOINDUCED PHENOMENA

PULSE ENERGY DEPENDENCE OF DEFECT GENERATION IN BRAGG GRATING OPTICAL FIBER MATERIALS	47
T.E. Tsai, C.G. Askins, and E.J. Friebele	
PHOTOINDUCED SECOND HARMONIC GENERATION IN OPTICAL FIBERS: MATERIALS AND MECHANISMS	53
D.M. Krol, J.R. Simpson, D.J. DiGiovanni, R.M. Atkins, P.J. Lemaire, and K.T. Nelson	
PERMANENT PHOTOINDUCED REFRACTIVE INDEX CHANGES IN RARE EARTH DOPED GLASSES	59
Glen M. Williams, Jacqueline A. Ruller, and E. Joseph Friebele	

PART III: FIBER STRENGTH

*MECHANICAL PROPERTIES OF SiO ₂ VS. SiO ₂ -TiO ₂ BULK GLASSES AND FIBERS	67
Suresh T. Gulati	
CHARACTERIZATION OF CRITICAL PROPERTIES OF OPTICAL FIBER COATINGS	85
John W. Shea, John M. Turnipseed, Carl R. Taylor, James R. Petisce, and Bob J. Overton	
CHEMICAL KINETICS APPLIED TO THE FATIGUE OF SILICA FIBERS IN SODIUM HYDROXIDE SOLUTIONS	91
Daryl Inniss, Darryl L. Brownlow, Charles R. Kurkjian, and Lourdes R. Borges	
INFLUENCE OF RESIDUAL WATER ON THE STRENGTH OF METAL COATED OPTICAL FIBERS	97
M.M. Bubnov, E.M. Dianov, and S.L. Semjonov	

PART IV: INFRARED FIBERS

*IR TRANSMISSION CHALCOGENIDE GLASS FIBERS	105
T. Yamagishi, I. Inagawa, and J. Nishii	
GALLOGERMANATE GLASSES AS NEAR IR OPTICAL WAVEGUIDES	115
Paige L. Higby, Celia I. Merzbacher, Ishwar D. Aggarwal, and E. Joseph Friebele	
PLASMA-ENHANCED CHEMICAL VAPOR DEPOSITION OF ZrF ₄ -BASED FLUORIDE GLASS FILM AND OXYGEN DOPING EFFECTS ON GLASS FORMING ABILITY	121
K. Fujiura, Y. Nishida, K. Kobayashi, and S. Takahashi	
OPTICAL PROPERTIES OF ZrF ₄ THIN FILM FORMED BY VAPOUR PHASE DEPOSITION	127
Takao Kono, Shinzo Morita, Toshio Goto, and Akira Nishiwaki	

PART V: ACTIVE FIBERS - I

*MATERIALS ASPECTS OF OPTICAL AMPLIFIERS	135
D.J. DiGiovanni	
Yb ³⁺ SENSITISED Er ³⁺ DOPED SILICA OPTICAL FIBRE WITH ULTRA HIGH TRANSFER EFFICIENCY AND GAIN	143
J.E. Townsend, W.L. Barnes, and S.G. Grubb	
QUANTITATIVE DETERMINATION OF Er IN SILICA-BASED MATRICES	149
Daniel W. Oblas, Francis Pink, Mahendra P. Singh, Joseph Connolly, Donald Dugger, and T. Michael Wei	
CONCENTRATION AND HYDROXYL IMPURITY QUENCHING OF THE ⁴ I _{13/2} - ⁴ I _{15/2} LUMINESCENCE IN Er ³⁺ DOPED SODIUM SILICATE GLASSES	157
Allan J. Bruce, W.A. Reed, A.E. Neeves, L.R. Copeland, W.H. Grodkiewicz, and A. Lidgard	
CONCENTRATION EFFECT OF ERBIUM-DOPED SILICA BASED MULTI-COMPONENT GLASS FIBERS	163
Y. Morishita, K. Muta, and N. Sugiyama	

*Invited Paper

EXCITED STATE ABSORPTION IN Pr^{3+} DOPED FLUOROZIRCONATE GLASS	169
R.S. Quimby and B. Zheng	
COMPOSITIONAL DEPENDENCE OF THE QUANTUM EFFICIENCY OF THE TRANSITION AT $1.3 \mu\text{m}$ OF PRASEODYMIUM IN HALIDE GLASSES	175
A. Swartz, A. Elyamani, R. Pafchek, E. Snitzer, and G.H. Sigel, Jr.	
EXCITED-STATE-ABSORPTION CROSS SECTIONS AND AMPLIFIER MODELING IN THE 1300-nm REGION FOR Nd-DOPED GLASSES	183
S. Zemon, B. Pedersen, G. Lambert, W.J. Miniscalco, B.T. Hall, R.C. Folweiler, B.A. Thompson, and L.J. Andrews	

PART VI: ACTIVE FIBERS - II

OPTICAL PROPERTIES OF MATERIALS FOR OPTICAL AMPLIFIERS AT $1.3 \mu\text{m}$	191
B. Hessen, S.A. Sunshine, L.F. Schneemeyer, A.E. Neeves, and W.A. Reed	
SITE-SELECTIVE SPECTROSCOPY OF THULIUM-DOPED GLASSES	197
A. Pearson, J.R. Lincoln, W.S. Brocklesby, and J.N. Carter	
LUMINESCENT PROPERTIES OF RARE EARTH DOPED AlF_3 -BASED GLASSES	203
L.R. Copeland, W.A. Reed, M.R. Shahriari, T. Iqbal, P. Hajcak, and G.H. Sigel, Jr.	
ERBIUM DOPED TELLURITE GLASSES	209
Jau-Sheng Wang, Elias Snitzer, and George H. Sigel, Jr.	
EFFICIENT ERBIUM-DOPED FIBER AMPLIFIERS PUMPED IN THE 800-nm BAND	215
B. Pedersen, S. Zemon, and W.J. Miniscalco	
THE ROLE OF GLASS COMPOSITION IN THE PERFORMANCE OF Er^{3+} -, Nd^{3+} -, AND Pr^{3+} -DOPED FIBER AMPLIFIERS	221
W.J. Miniscalco, B. Pedersen, S. Zemon, B.A. Thompson, G. Lambert, B.T. Hall, R.C. Folweiler, T. Wei, M.L. Dakss, and L.J. Andrews	

PART VII: NONLINEAR MATERIALS

*GLASSES FOR NONLINEAR OPTICS	229
M.A. Newhouse	
NONLINEAR OPTICAL PROPERTIES OF CdS-SiO_2 GLASS COMPOSITE THIN FILMS PREPARED BY RF-SPUTTERING	239
I. Tanahashi, M. Yoshida, Y. Manabe, T. Mitsuyu, T. Tokizaki, and A. Nakamura	
FUSED COUPLER OPTICAL SWITCH USING A PHOTOCROMIC MATERIAL	245
Yuji Kobayashi, Toshifumi Hosoya, Tsuyoshi Nonaka, and Yasuo Matsuda	

PART VIII: THIN FILMS

*POLYMERIC INTEGRATED OPTICS	253
Kurt H. Lösch, Peter Kersten, and Wiltraud Wischmann	

*Invited Paper

ENHANCEMENT OF OPTICAL THIRD ORDER NONLINEARITY IN MAIN-CHAIN ORIENTED POLYTHIOPHENES Haruki Okawa, Tatsuo Wada, and Hiroyuki Sasabe	263
SYNTHESIS, CHARACTERIZATION, AND OPTICAL PROPERTIES OF INORGANIC POLYMER FILMS Gregory J. Exarhos, William D. Samuels, and Sarah D. Burton	269
ANISOTROPIC METALLIC ISLAND FILMS FOR POLARIZERS Kazutaka Baba, Jun-Ichiro Katsu, and Mitsunobu Miyagi	275
LASER-INDUCED FLUORESCENCE IN DOPED METAL OXIDE PLANAR WAVEGUIDES DEPOSITED FROM AQUEOUS SOLUTIONS Nancy J. Hess, Gregory J. Exarhos, and Susanne M. Wood	281
SOL-GEL AND RF SPUTTERING THIN FILM COATINGS FOR FIBER OPTIC SENSOR APPLICATIONS M.R. Shahriari, J.Y. Ding, C.M. Wang, C.H. Lin, and G.H. Sigel, Jr.	287
PART IX: PLANAR WAVEGUIDES - I	
*ACTIVE WAVEGUIDES IN LiNbO_3 M.P. De Micheli	295
DOPANTS IN LiNbO_3 : LATTICE SITE LOCATION, ION IMPLANTATION AND EXPITAXIAL REGROWTH L. Rebouta, J.C. Soares, M.F. Da Silva, J.A. Sanz-Garcia, E. Dieguez, and F. Agullo-Lopez	311
SEGMENTED PROTON EXCHANGE WAVEGUIDE ON LiNbO_3 FOR SHG USING SIMULTANEOUS MODULATION OF THE INDICES AND NONLINEAR COEFFICIENTS Q. He, S. Chen, M.P. De Micheli, D.B. Ostrowsky, F. Armani, D. Delacourt, E. Lallier, and M. Papuchon	317
WAVEGUIDES FABRICATED IN LiNbO_3 BY PROTON IMPLANTATION P. Moretti, P. Thevenard, K. Wirl, and P. Hertel	323
PART X: PLANAR WAVEGUIDES - II	
FORMATION OF PLANAR AND STRIP WAVEGUIDES IN KNbO_3 BY He ION IMPLANTATION D. Fluck, M. Fleuster, P. Günter, and Ch. Buchal	331
REALIZATION OF SiO_2 - B_2O_3 - TiO_2 WAVEGUIDES AND REFLECTORS ON Si SUBSTRATES Hartmut W. Schneider	337
PHOTOLITHOGRAPHIC IMAGING OF PLANAR OPTICAL WAVEGUIDES AND INTEGRATED OPTIC DEVICES ONTO POROUS SILICATE GLASSES AND SILICA SOL-GELS Edgar A. Mendoza and Harry D. Gafney	343
LOW LOSS RIB-WAVEGUIDES IN SOI J. Schmidtchen, B. Schüppert, A. Splett, and K. Petermann	351
A GENERAL ANALYTICAL SOLUTION FOR THE CONCENTRATION PROFILES OF ION-EXCHANGED PLANAR WAVEGUIDES Xiaoming Li and Paul F. Johnson	357

*Invited Paper

SURFACE CHEMISTRY OF Fe OXIDE IMPREGNATED POROUS VYCOR GLASS	363
D. Sunil, M.H. Rafailovich, J.C. Sokolov, H.D. Gafney, S.A. Schwarz, and B.J. Wilkens	
PART XI: ION IMPLANTATION	
PICOSECOND NONLINEAR OPTICAL RESPONSE OF COPPER CLUSTERS CREATED BY ION IMPLANTATION IN FUSED SILICA	369
R.H. Magruder, III, R.J. Haglund, Jr., L. Yang, J.E. Wittig, K. Becker, and R.A. Zuhr	
OPTICAL WAVEGUIDES IN THERMALLY GROWN SiO₂ ON Si USING NITROGEN ION IMPLANTATION	375
S.P. Wong, E.Y.B. Pun, W.T. Lam, and P.S. Chung	
LOCAL STRUCTURE AROUND Er IN MeV Er-IMPLANTED SILICA	381
A. Polman, M.A. Marcus, D.C. Jacobson, and J.M. Poate	
OPTICAL CHARACTERISTICS OF PLANAR WAVEGUIDES IN SIMOX STRUCTURES	387
G.T. Reed, A.G. Rickman, B.L. Weiss, F. Namavar, E. Cortesi, and R.A. Soref	
AUTHOR INDEX	395
SUBJECT INDEX	397