

Excimer Laser Technology

D. Basting · G. Marowsky (Eds.)

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With 257 Figures

 Springer

Editors

Dr. Dirk Basting
2200 South Ocean Lane
Fort Lauderdale, FL 33316-3831
USA

Professor Dr. Gerd Marowsky
Laser-Laboratorium Göttingen e.V.
Hans-Adolf-Krebs-Weg 1
37077 Göttingen, Germany

Copy editor

Dr. Uwe Brinkmann, Göttingen-Bovenden, Germany

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Preface

The aim of this book is to provide a practical guide on the fundamentals, status of present technology and applications of excimer lasers. Theoretical details have been intentionally omitted. The book has emerged from “Excimer laser technology: Laser sources, optics, systems and applications” issued earlier by a manufacturer of excimer lasers. The scope of the book has been considerably enlarged and the knowledge deepened by the participation of several renowned international researchers. Thus, it may form not only the basis for training programs for service and maintenance personnel on excimer lasers, but serves also to address researchers, technologists and newcomers in the field of UV lasers and applications who require a thorough introduction to the field.

The book is divided into two main chapters: Fundamentals and Applications, along with a short introductory chapter, briefly covering a variety of subjects and some historical remarks and a final outlook chapter. The chapter ‘Fundamentals’ provides a short introduction to laser physics and some descriptions of optical components needed for successful operation and application of lasers operating in the UV spectral range. This includes the special demands concerning optical materials, beam shaping optics, and beam diagnostics. The chapter ‘Applications’ opens with an overview of the various fields of actual excimer laser applications, then goes into more detail in important fields like ablative micro-fabrication, nano-structuring with femtosecond excimer laser pulses, material modification including microlithography, deposition of thin films, combustion analysis, and medical applications. At the leading edge of current research, the chapter on ultra-high intensity applications deals with the generation of “hollow atoms”. Micro-fabrication using F₂-laser radiation at 157 nm completes the range of UV-laser applications.

The last chapter focuses on next-generation lithography using 13.5 nm radiation. Radiation sources in the extreme UV (EUV), realized by both laser and discharge pumping, are expected to transform micro-lithography into nano-lithography. The editors and authors hope that this publication will be a valuable source of information for students, engineers, and scientists wishing to work in the field of excimer lasers.

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The editors took liberty to make appropriate changes in some of the manuscripts for further improvement of the book.

Göttingen,
December 2004

Dirk Basting
Gerd Marowsky

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List of Contributors

Stephen G. Anderson

Sect. 1.3

Laser Focus World
Associate Publisher, Editor-in-chief
Pennwell
98 Spit Brook Rd.
Nashua, NH 03062
Phone: +1-603-891-9320
Fax: +1-603-891-0574
stevega@pennwell.com

Dr. D. Basting

Sects. 1.1, 1.2

Lambda Physik AG
Now:
2200 South Ocean Lane
Fort Lauderdale
FL 33316-3831 USA
Dirk@Basting.net

Dr. J. Bekesi

Sect. 14

Laser-Laboratorium Göttingen e.V.
Hans-Adolf-Krebs-Weg 1
37077 Göttingen
Phone: +49-551-503528
Fax: +49-551-503599
jbekesi@llg.gwdg.de

Prof. H. von Bergmann

Sects. 3, 4, 5

Laser Research Institute
Dept. Physics
University of Stellenbosch
South Africa

Private Bag X1, Matieland, 7602

Phone: +21-808-3376

Fax: +21-808-3385

hmvb@sun.ac.za

Dr. H. Bernitzki

Sect. 8

Laser-Zentrum Hannover e.V.
Now:
Jenoptik Laser Optik Systeme
GmbH
Göschwitzer Str. 25
07746 Jena
Phone: +49-3641-65 3256
Fax: +49-3641-65 3850
Helmut.Bernitzki@Jenoptik.com

Dr. V. Beushausen

Sect. 18

Laser-Laboratorium Göttingen e.V.
Hans-Adolf-Krebs-Weg 1
37077 Göttingen
Phone: +49-551-503523
Fax: +49-551-503599
vbeushau@llg.gwdg.de

Prof. A. B. Borisov

Sect. 20

University of Illinois at Chicago
Department of Physics
College of Liberal Arts and Sciences
845 West Taylor Street
Chicago, Illinois 60607-7059
USA
Phone: +1-312-996-4868
Fax: +1-312-996-8824
alexbor@uic.edu

Prof. V. M. Borisov

Sect. 5.2

State Research Centre Russian
Federation TRINITI
Pushkov Street
142092 Troitsk
Phone: +7-095-334-0666
Fax: +7-095-334-5775
borisov@triniti.ru

Dr. K. Boyer

Sect. 20

250 East Alameda (Apt. 812)
Santa Fe, New Mexico 87501
Keithxb@comcast.net

Dr. I. Bragin

Sect. 5.2

Lambda Physik AG
Hans-Böckler-Str 12
37079 Göttingen
Phone: +49-551-6938204
Fax: +49-551-68691
ibragin@lambdaphysik.com

J. Davis

Sect. 20

davisj@ppdmail.nrl.navy.mil

Prof. N. Djeu

Sect. 1.2

University of South Florida
Tampa FL 33620
ndjeu@chuma.cas.usf.edu

Dr. R.F. Delmdahl

Sect. 21

Lambda Physik AG
Hans-Böckler-Str 12
37079 Göttingen
Phone: +49-551-6938397
Fax: +49-551-68691
rdelmdahl@lambdaphysik.com

Prof. H. Exner

Sect. 12

Laserinstitut Mittelsachsen e.V.
Hochschule Mittweida
University of Applied Sciences
Technikumplatz 17
09648 Mittweida
Phone: +49-3727-580
Fax: +49-3727-58-1379
exner@laserinstitut-mittelsachsen.de

Dr. M. Fiebig

Sect. 16.2

Lambda Physik AG
Now:
Max-Born-Institut Berlin
Max-Born-Str. 2a
12489 Berlin
Phone: +49-30-6392-1404
Fax: +49-30-6392-1404
fiebig@mbi-berlin.de

Prof. C. Fotakis

Sect. 15

Foundation for Research and
Technology-Hellas (FORTH)
Institute of Electronic Structure
and Laser
P.B. 1527, Vasilika Vouton
Heraklion, GR-711 10
Crete, Hellas
Phone: +30-2810-391273
Fax: +30-2810-391305
fotakis@iesl.forth.gr

Dr. L. Herbst

Sect. 21

Lambda Physik AG
Hans-Böckler-Str 12
37079 Göttingen
Phone: +49-551-6938404
Fax: +49-551-68691
lherbst@lambdaphysik.com

Prof. P.R. Herman

Sect. 13
 Electrical and Computer
 Engineering
 University of Toronto
 10 King's College Road
 Toronto, Canada M5S 3G4
 Phone: +1-416-978-7722
 Fax: +1-416-971-3020
 p.herman@utoronto.ca

Dr. M. Hessling

Sect. 11.3
 LINOS Photonics GmbH & Co. KG
 BU Bio Photonics
 Isartalstr. 43
 80469 München
 Phone: +49-89-7202-539
 Fax: +49-89-7202-141
 Martin.hessling@linos.de

Dr. J. Ihlemann

Sects. 11.2, 11.2.5, 14
 Laser-Laboratorium Göttingen e.V.
 Hans-Adolf-Krebs-Weg 1
 37077 Göttingen
 Phone: +49-551-503544
 Fax: +49-551-503599
 jihle@llg.gwdg.de

Dr. K. Jain

Sect. 1.2
 Anvik Corporation
 6 Skyline Dr.
 Hawthorne
 NY 10532
 kjain@anvik.com

Dr. N. Kaiser

Sect. 8
 Fraunhofer Institut Angewandte
 Optik und Feinmechanik
 Albert-Einstein-Straße 7
 07745 Jena
 Phone: +49-3641-807-321
 Fax: +49-3641-807-601
 norbert.kaiser@iof.fraunhofer.de

Dr. B. Keiper

Sect. 12
 3D-Micromac AG
 Annaberger Str. 240
 09125 Chemnitz
 Phone: +49-371-400-4334
 Fax: +49-371-400-4340
 keiper@3d-micromac.com

J.-H. Klein-Wiele

Sect. 14
 Laser-Laboratorium Göttingen e.V.
 Hans-Adolf-Krebs-Weg 1
 37077 Göttingen
 Phone: +49-551-503529
 Fax: +49-551-503599
 jhkleinw@llg.gwdg.de

Prof. A. Koch

Sect. 9
 HAWK Fachhochschule
 Hildesheim/Holzminden/Göttingen
 Von-Ossietzky-Str. 99
 37085 Göttingen
 Phone: +49-551-3705-100
 Fax: +49-551-3705-101
 Andrea.koch@pmf.fh-goettingen.de

Dr.-Ing. K. Körber

Sects. 2, 16.3, 16.5
 Oberer Stephansberg 38 E
 96049 Bamberg
 Phone: +49-951-5098493
 klaus.koerber@web.de

Dr. C. Kulik

Sects. 2, 16.3
 Laser-Zentrum Hannover e.V.
 Hollerithallee 8
 30419 Hannover
 Phone: +49-511-2788-270
 Fax: +49-511-2788-100
 kk@lzh.de

Dr. H. Lauth

Sect. 8

Jenoptik Laser Optik
Systeme GmbH
Göschwitzer Str. 25
07746 Jena
Phone: +49-3641-65 3188
Fax: +49-3641-65 3764
Hans.Lauth@Jenoptik.com

Dr. H. Lubatschowski

Sect. 19

Laser-Zentrum Hannover e.V.
Hollerithallee 8
30419 Hannover
Phone: +49-511-2788-279
Fax: +49-511-2788-100
hl@lzh.de

Prof. G. Marowsky

Sect. 1.1

Laser-Laboratorium Göttingen e.V.
Hans-Adolf-Krebs-Weg 1
37077 Göttingen
Phone: +49-551-503530
Fax: +49-551-503599
gmarows@gwdg.de

Dr. K. Mann

Sect. 7

Laser-Laboratorium Göttingen e.V.
Hans-Adolf-Krebs-Weg 1
37077 Göttingen
Phone: +49-551-503541
Fax: +49-551-503599
kmann@llg.gwdg.de

Dr. B. Nikolaus

Sect. 21

Lambda Physik AG
Hans-Böckler-Str 12
37079 Göttingen
Phone: +49-551-6938157
Fax: +49-551-68691
bnikolaus@lambdaphysik.com

Dr. P. Oesterlin

Sect. 9

Innovavent GmbH
Bertha-von-Suttner-Str. 5
37085 Göttingen
Phone: +49-551-90047-10
Fax: +49-551-90047-19
oesterlin@innovavent.com

R. Pätzel

Sect. 6

Lambda Physik AG
Hans-Böckler-Str 12
37079 Göttingen
Phone: +49-551-6938155
Fax: +49-551-68691
rpaetzel@lambdaphysik.com

Dr. D. G. Papazoglou

Sect. 15

Foundation for Research and
Technology-Hellas (FORTH)
Institute of Electronic Structure
and Laser
P.B. 1527, Vasilika Vouton
Heraklion, GR-711 10
Crete, Hellas
Phone: +30-2810-391273
Fax: +30-2810-391305
dpapa@iesl.forth.gr

Dr. T. Petsch

Sect. 12

3D-Micromac AG
Annaberger Str. 240
09125 Chemnitz
Phone: +49-371-400-430
Fax: +49-371-400-4340
petsch@3dmicromac.com

Dr. U. Rebhan

Sect. 4

Lambda Physik AG
Hans-Böckler-Str 12
37079 Göttingen

Phone: +49-551-6938-221
 Fax: +49-551-68691
 urebhan@lambdaphysik.com

Prof. G. Reißer

Sect. 17
 Hochschule Mittweida
 University of Applied Sciences
 Technikumplatz 17
 09648 Mittweida
 Phone: +49-3727-580
 Fax: +49-3727-58-1379
 greisse@htwm.de

Prof. Ch.K. Rhodes

Sect. 20
 University of Illinois at Chicago
 Department of Physics
 College of Liberal Arts and Sciences
 845 West Taylor Street
 Chicago, Illinois 60607-7059
 USA
 Phone: +1-312-996-4868
 Fax: +1-312-996-8824
 rhodes@uic.edu

Dr. P. Simon

Sect. 14
 Laser-Laboratorium Göttingen e.V.
 Hans-Adolf-Krebs-Weg 1
 37077 Göttingen
 Phone: +49-551-503521
 Fax: +49-551-503599
 psimon@llg.gwdg.de

Dr. U. Stamm

Sects. 3, 4, 6, 22
 Xtreme technologies GmbH
 Hans-Adolf-Krebs-Weg 1

37077 Göttingen
 Phone: +49-551-82073-101
 Fax: +49-551-82073-110
 ustamm@xtremetec.de

Dr. M. Wehner

*Sects. 10, 11.1, 11.2, 11.2.1-11.2.4,
 11.2.6-11.2.7, 16.1, 16.4*
 Fraunhofer-Institut Lasertechnik
 Steinbachstr. 15
 52074 Aachen
 Phone: +49-241-8906-202
 Fax: +49-241-8906-121
 wehner@ilt.fhg.de

Dr. S. Weißmantel

Sect. 17
 Laserinstitut Mittelsachsen e.V.
 Technikumplatz 17
 09648 Mittweida
 Phone: +49-3727-581396
 Fax: +49-3727-581449
 steffen@htwm.de

Dr. I. Zergioti

Sect. 15
 Foundation for Research and
 Technology-Hellas (FORTH)
 Now:
 National Technical University
 of Athens
 Physics Department
 Iron Polytehneiou 9
 15780 Zografou
 Athens, Greece
 Phone: +30-210-772-3345
 Fax: +30-210-772-2928
 zergioti@central.ntua.gr