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Photon, Beam, and Plasma Stimulated Chemical Processes at Surfaces

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MRS

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Photon, Beam, and Plasma Stimulated Chemical Processes at Surfaces

Symposium held December 1-4, 1986, Boston, Massachusetts, U.S.A.

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Preface

This volume is a compilation of papers presented at the symposium on Photon, Beam, and Plasma Stimulated Chemical Processes at Surfaces, which was part of the 1986 Fall Meeting of the Materials Research Society. The symposium, held in Boston from December 1 to 4, highlighted recent advances in the rapidly expanding use of lasers, incoherent photon sources, ion beams, electron beams, and plasmas to enhance or modify chemical processes at surfaces. A variety of work was reported, ranging from very fundamental studies of modifying surface chemistry to applications in microelectronics technology, including VLSI and optoelectronic devices. This symposium was the fifth annual symposium held at the MRS Fall Meeting with this general theme, beginning with Laser Diagnostics and Photochemical Processing for Semiconductor Devices in 1982. Considered from this vantage point, this volume is more than a mere compilation of papers; it is a fairly comprehensive snapshot of this exciting and developing field.

The symposium consisted of two half-day plenary sessions held jointly with the symposia on Beam-Solid Interactions and Transient Processes, and on Science and Technology of Microfabrication, along with three additional days of invited and contributed talks. A large poster session was also held, which included several presentations of very recent results. In total, over 100 papers were presented at the four-day symposium.

The subject of this volume is a truly interdisciplinary field. Advances in understanding the fundamental interactions at surfaces, demonstrating photon and beam-induced surface modifications and their successful applications, and optical diagnosis and modelling of these processes often proceed hand-in-hand. It was clear from the presentations at the symposium that several intriguing advances have been made in the fundamental understanding of these processes. Strong evidence was presented for adsorbate photodissociation, ion-bombardment-induced surface modification, and the role of electron-hole pair formation in etching and deposition reactions. Among the many noteworthy practical developments were demonstrations of semi-custom interconnections in integrated circuits and the fabrication of holographic gratings for distributed feedback semiconductor lasers. Several potentially important processes were demonstrated, including laser projection patterning for direct etching and deposition of micron and submicron-size features, direct laser writing, laser doping, III-V compound semiconductor deposition, and epitaxial growth.

Clearly, the area of laser and beam-induced chemical modifications of surfaces will continue to grow, with many more advances in fundamental understanding and applications yet to be realized.

Symposium Organizers

Vincent M. Donnelly
AT&T Bell Laboratories
Murray Hill, New Jersey

Irving P. Herman
Columbia University
New York, New York

Masataka Hirose
Hiroshima University
Higashihiroshima, JAPAN

Acknowledgments

We wish to thank the invited speakers for setting an exciting tone for the meeting:

Joint Session Plenary Speakers

W.R. Appleton
A.F. Bernhardt
D.J. Ehrlich
J.E. Greene
Y. Horiike
H. Kurz
R.M. Osgood, Jr.
A. Wagner

Invited Speakers

C.I.H. Ashby
G.S. Higashi
M. Hirose
T.W. Sigmon
H.F. Winters
J.T. Yates, Jr.

and the presenters of contributed and poster session papers for making this symposium a success.

We would also like to thank the session chairs for helping run the symposium:

D. Adler
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J.I. Steinfeld
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