New Methods, Mechanisms and Models of Vapor Deposition

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New Methods, Mechanisms and Models of Vapor Deposition

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PREFACE

This MRS proceedings volume is a compilation of edited papers presented at Symposium I, "New Methods, Mechanisms and Models of Vapor Deposition," held April 24–26 at the 2000 MRS Spring Meeting in San Francisco, California.

Vapor deposition is increasingly used to synthesize thin films and coatings that underpin numerous technologies from microelectronics to aircraft engines. As the structural and compositional complexity of these vapor deposited materials increases, many new methods of vapor deposition have been developed. The design of these new processes and materials are increasingly founded upon a detailed scientific understanding of the atomic scale mechanisms of growth. Today, the community is beginning to rely more heavily upon the use of models that link these mechanisms to the growth conditions. The symposium, "New Methods, Mechanisms and Models of Vapor Deposition," explored these interlinked issues and their applications in micro- and magnetoelectronics, hard coatings, photovoltaics, high-T_c thin films, and the group three nitrides. Invited and contributed presentations described many novel deposition techniques, reviewed rapid advances in *in situ* sensor technology, assessed the impact of new control approaches, and investigated the use of mathematical models to both simulate reactor conditions and control the growth of atomic scale structures during the deposition process. These many developments are leading to many exciting new advances in this scientific and technologically important field.

The symposium proceedings have been organized so that many of the new methods of vapor deposition are introduced first. This is followed by a series of papers addressing the mechanisms of vapor deposition including the use of *in situ* characterization techniques to observe them. The proceedings finishes with papers exploring the application of modeling techniques to simulate the growth of vapor deposited structures. The use of *in situ* sensors to validate simulations is widely covered. Together, the papers in this proceedings provide a detailed view of the state-of-the-art, and will be beneficial to all who are engaged in its research and development.

We want to thank the many participants and contributors to the symposium. Their work is rapidly expanding the scientific and technological frontiers of vapor deposition. We are particularly grateful to the invited speakers: J. Greene, S.M. Rossnagel, J. Storer, J.C. Bean, H.A. Atwater, J.A. Drewes, R. Hull, S. Parkin, J.J. Zinck, S.M. George, D.J. Srolovitz, R.J. Kee, K.F. Jensen, and R.L. Kosut. We are indebted to Carolyn Frey and Sherri Armstrong of the University of Virginia who provided enormous assistance during all aspects of the organization of the symposium and the preparation of this publication.

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