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ADHESIVES, SEALANTS, AND COATINGS FOR SPACE AND HARSH ENVIRONMENTS

Edited by

Lieng-Huang Lee

*Xerox Corporation
Webster, New York*

PLENUM PRESS • NEW YORK AND LONDON

Library of Congress Cataloging in Publication Data

International Symposium on Adhesives, Sealants, and Coatings for Space and Harsh Environments (1987: Denver, Colo.)

Adhesives, sealants, and coatings for space and harsh environments / edited by Lieng-Huang Lee.

p. cm.—(Polymer science and technology; v. 37)

"Proceedings of an International Symposium on Adhesives, Sealants, and Coatings for Space and Harsh Environments, sponsored by the Division of Polymeric Materials: Science and Engineering of the American Chemical Society, held April 7–9, 1987, in Denver, Colorado"—T.p. verso.

Includes bibliographical references and index.

ISBN-13: 978-1-4612-8308-9 e-ISBN-13: 978-1-4613-1047-1

DOI: 10.1007/978-1-4613-1047-1

1. Adhesives—Congresses. 2. Sealing compounds—Congresses. 3. Coatings—Congresses.

I. Lee, Lieng-Huang, 1924— II. American Chemical Society. Division of Polymeric Materials: Science and Engineering. III. Title. IV. Series.

TP967.L57 1987

88-21002

668'.3—dc19

CIP

Proceedings of an International Symposium on Adhesives, Sealants, and Coatings for Space and Harsh Environments, sponsored by the Division of Polymeric Materials Science and Engineering of the American Chemical Society, held April 7–9, 1987, in Denver, Colorado

© 1988 Plenum Press, New York

Softcover reprint of the hardcover 1st edition 1988

A Division of Plenum Publishing Corporation

233 Spring Street, New York, N.Y. 10013

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PREFACE

New technologies constantly generate new demands for exotic materials to be used in severe environments. The rapid developments of aerospace industries during the last two decades have required new materials to survive extreme high and low temperatures and various radiations. The exploration of new energy sources, e.g., solar and geothermal, has led us to develop new solar collectors and geothermal devices. Even the search for new oils has demanded that we study the corrosive environment of oil fields.

In the telecommunication industries, optical fibers have been adopted broadly to replace metallic conductors. However, none of the optical fibers can survive abrasion or corrosion without the application of a coating material. For microelectronics, protection in terms of coatings and encapsulants is deemed necessary to prevent corrosion. One of the major causes of corrosion has been shown to be water which appears to be abundant in our earthly environments.

Water can attack the bulk adhesive (or sealant), the interface, or the adherend. Water can also cause delamination of coating film, and it is definitely the major ingredient in causing cathodic or anodic corrosion. Thus, water becomes the major obstacle in solving durability problems of various materials in harsh environments.

As an intent to solve some of the above problems, an International Symposium on Adhesives, Sealants, and Coatings for Space and Harsh Environments was organized for the Division of Polymeric Materials and Engineering of the American Chemical Society. The Symposium was held between April 7 and 9, 1987 in the Radisson Hotel, Denver, Colorado. The meeting was well attended by those from academia and industries.

A total of 34 papers was presented to six sessions. The papers, which were properly refereed and revised, are now included in this volume of Proceedings, which also contains several contributions submitted after the Symposium and the discussions. This volume is divided into six parts:

- I. Environmental Exposure
- II. Stress and Interface
- III. Adhesives for Space and Harsh Environments
- IV. Sealants for Space and Harsh Environments
- V. Coatings for Corrosive Environments
- VI. Coatings for Electronic and Optical Environments

As Chairman of the Symposium, I would like to thank our contributors; their biographies are attached at the end of this volume. I am also indebted to our Session Chairmen: Professor C.E. Rogers, Dr. W.D. Bascom, Dr. R.M. Evans and Dr. J.W. Holubka, for their assistance. I would like to thank Dr. J. Scott Thornton, for his talk during the Symposium Banquet. I sincerely appreciate the skill of Ms. D.M. Costenoble in retyping all manuscripts for this volume. I appreciate the support of Xerox Webster Research Center for me to perform this task. I would like to thank Mr. F. Belli and his group of the Technical Information Center in assisting me to prepare author and subject indexes.

Acknowledgment is also made to the donors of the Petroleum Research Fund, administered by the American Chemical Society. Their funding partially assisted several overseas speakers to attend the symposium.

Lieng-Huang Lee
April, 1988

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