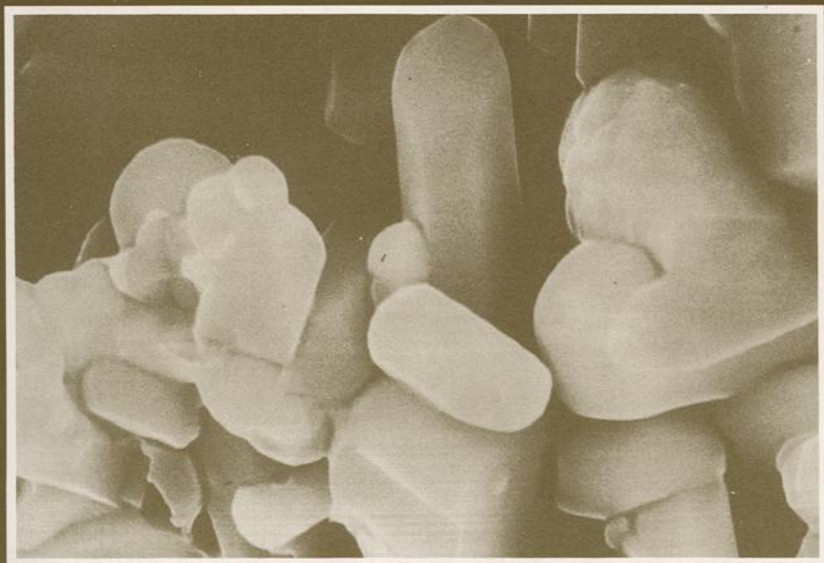


# Wear Testing of Advanced Materials



Divakar/Blau, editors



STP 1167

STP 1167

***Wear Testing of Advanced  
Materials***

*Ramesh Divakar and Peter J. Blau, editors*

ASTM Publication Code Number (PCN)  
04-011670-27



ASTM  
1916 Race Street  
Philadelphia, PA 19103

## Library of Congress Cataloging-in-Publication Data

Wear testing of advanced materials / Ramesh Divakar and Peter J. Blau, editors.  
(STP ; 1167)

Symposium on Wear Testing of Advanced Materials presented in San Antonio on 14 Nov. 1992 and sponsored by ASTM Committee G-2 on Wear and Erosion.

“ASTM publication code number (PCN) 04-011670-27.”

Includes bibliographical references and index.

ISBN 0-8031-1476-1

1. Mechanical wear—Congresses. 2. Composite materials—Testing—  
Congresses. 3. Aluminum oxide—Testing—Congresses. 4. Ceramic materials—  
Testing—Congresses. I. Divakar, Ramesh, 1959- . II. Blau, P. J. III. ASTM  
Committee G-2 on Erosion and Wear. IV. Series: ASTM special technical  
publication; 1167.

TA418.4.W43 1992

620.1'1292—dc20

92-2357

CIP

Copyright © 1992 AMERICAN SOCIETY FOR TESTING AND MATERIALS, Philadelphia, PA. All rights reserved. This material may not be reproduced or copied, in whole or in part, in any printed, mechanical, electronic, film, or other distribution and storage media, without the written consent of the publisher.

### Photocopy Rights

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by the AMERICAN SOCIETY FOR TESTING AND MATERIALS for users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$2.50 per copy, plus \$0.50 per page is paid directly to CCC, 27 Congress St., Salem, MA 01970; (508) 744-3350. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is 0-8031-1476-1/92 \$2.50 + .50.

### Peer Review Policy

Each paper published in this volume was evaluated by three peer reviewers. The authors addressed all of the reviewers' comments to the satisfaction of both the technical editor(s) and the ASTM Committee on Publications.

The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of these peer reviewers. The ASTM Committee on Publications acknowledges with appreciation their dedication and contribution to time and effort on behalf of ASTM.

Printed in Philadelphia, PA  
August 1992

# Foreword

The Symposium on Wear Testing of Advanced Materials was presented in San Antonio, TX, on 14 November 1992. ASTM Committee G-2 on Wear and Erosion sponsored the symposium. Ramesh Divakar, The Carborundum Company, and Peter J. Blau, Oak Ridge National Laboratory, served as chairmen of the symposium and editors of the resulting publication.

# Contents

<b>Overview</b>	1
<b>WEAR TESTING METHODS FOR ADVANCED MATERIALS</b>	
<b>Effect of Test Variables on the Friction and Wear of Alumina—SHYAM BAHADUR AND ISDARYANTO ISKANDAR</b>	7
<b>Effect of Test Machine Dynamics on the Sliding Wear of Alumina—MARK G. GEE</b>	24
<b>Evaluation of Wear Materials for Seal Applications—JOSEPH J. AU</b>	45
<b>Apparatus for Thrust Wear Testing of Advanced Tribological Materials—SCOTT L. HORMAN AND RONALD K. EYRE</b>	56
<b>Wear Testing of Nonmetallic Materials for Bearing Applications—JOSEPH J. AU AND JONG Y. YUNG</b>	69
<b>Fretting Wear of Continuous Fiber-Reinforced Polymer Composites—OLAF JACOBS, KLAUS FRIEDRICH, AND KARL SCHULTE</b>	81
<b>Evaluation of Abrasive Particle Trajectories in a Slurry Jet During Erosion of Metal Matrix Composites—SYLVAIN TURENNE AND MICHEL FISET</b>	97
<b>Applications of Materials Wear Testing to Solids Transport via Centrifugal Slurry Pumps—KRISHNAN V. PAGALTHIVARTHI AND FRANK W. HELMLY</b>	114
<b>ANALYSIS AND INTERPRETATION OF WEAR TESTS</b>	
<b>Results from a U.K. Interlaboratory Project on Dry Sliding Wear of Alumina—MARK G. GEE</b>	129
<b>Wear Diagram for Sliding of Silicon Nitrides—DAE-SOON LIM, SEONG-KHIL PARK, AND HAHNGUE MOON</b>	151
<b>Sliding Wear Testing and Data Analysis Strategies for Advanced Engineering Ceramics—PETER J. BLAU AND CHARLES S. YUST</b>	161

ISBN 0-8031-1476-1