January 2013 Vol. 38 No. 1
www.mrs.org/bulletin

MRS Bulletin

MRS MATERIALS RESEARCH SOCIETY
Advancing materials. Improving the quality of life.

Organic single crystals

ALSO IN THIS ISSUE

The science of silks

CAMBRIDGE UNIVERSITY PRESS

https://doi.org/10.1557/mrs.2013.16 Published online by Cambridge University Press

https://doi.org/10.1557/mrs.2013.16

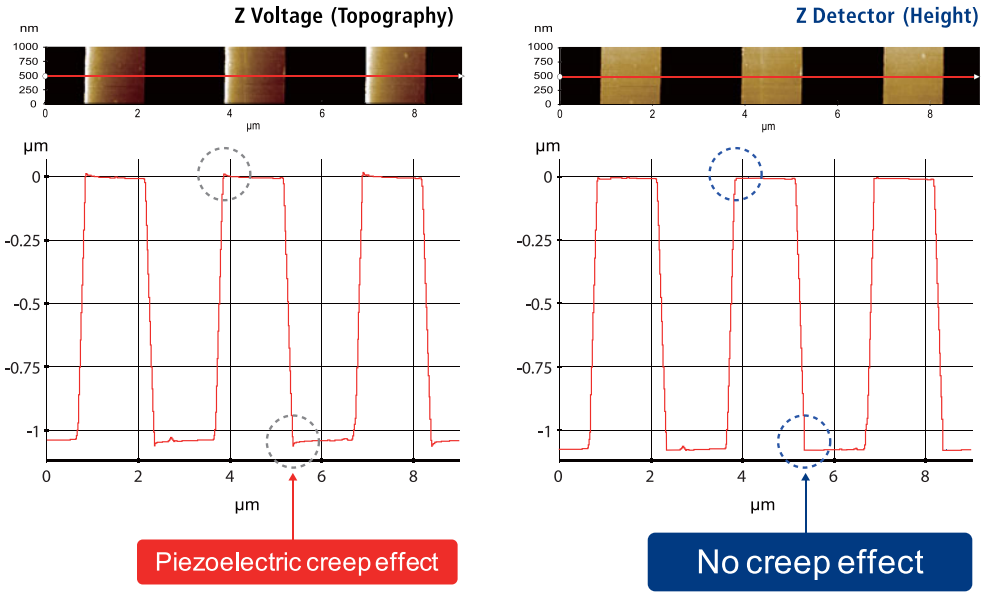
Park SYSTEMS

NX10
NX20

Atomic Force Microscope

www.parkAFM.com

ACCURATE AFM TOPOGRAPHY



Sample: 1 µm Nominal Step Height (9 µm x 1 µm, 2048 pixels x 128 lines)

The World's Most **Accurate AFM**

Low Noise Z Detector-based True Sample Topography™

The quality of your data is critical to your work and success. In today's world of where many existing technologies are reaching the limits of their potential, the key to relevant quality results is accuracy at the nanoscale. Park Systems' innovative NX Atomic Force Microscope (AFM) technology provides the most accurate nanoscale results at far lower total cost of ownership than traditional AFMs.

All AFM technology relies on precise piezo controlled movement. As such, AFMs often suffer from edge overshoots and piezo creep errors. While these errors can be small, when accuracy and consistency are important, they can cause large problems. To solve this problem, Park Systems has implemented the industry's leading low noise Z detector. Unlike other AFMs in the market using applied voltage signals, the low noise Z detector enables the recording of accurate sample surface height even during high-speed scanning.

The Park Systems NX technology builds on the company's leadership in AFM data accuracy and is available for both research and industrial enthusiasts. The Park NX10 provides researchers with a premium research-grade small sample AFM. For users needing larger sample capacity, the Park NX20 provides a high end large sample AFM, often required in hard disk and semiconductor industries for failure analysis.

THE ACCURATE CHOICE !

Please, visit us at **www.parkAFM.com/nx** for more information.

https://doi.org/10.1557/mrs.2013.16 Published online by Cambridge University Press

MRS Bulletin January 2013 Volume 38 Number 1 ISSN: 0883-7694 CODEN: MRSBEA

CONTENTS

ORGANIC SINGLE CRYSTALS

TECHNICAL FEATURE

DEPARTMENTS

OPINION

NEWS & ANALYSIS

ON THE COVER

Organic single crystals. This issue of *MRS Bulletin* provides an overview of the state of the art of the field of organic semiconductor single crystals, including materials, devices, and theories. The cover shows a single crystal of rubrene—the highest mobility organic semiconductor frequently used in experiments and modeling. Studies on rubrene reveal fundamental charge transport and optical properties of highly ordered molecular materials relevant to organic electronics and photonics. The photograph is courtesy of Pavel Irkhin, Rutgers University. See the technical theme that begins on page 15.

https://doi.org/10.1557/mrs.2013.16 Published online by Cambridge University Press

www.mrs.org/bulletin
MRS members—access *MRS Bulletin* online

www.mrs.org/energy-quarterly
Access Energy Quarterly online

www.mrs.org/mymrs
MRS Publications Alert—
receive advance Table of Contents by email

http://journals.cambridge.org/mrsbulletin-rss
Subscribe TODAY to the *MRS Bulletin* RSS Feed

https://doi.org/10.1557/mrs.2013.16 Published online by Cambridge University Press

MRS MATERIALS RESEARCH SOCIETY
Advancing materials. Improving the quality of life.

MRS Bulletin

EDITORIAL OFFICE 506 Keystone Drive, Warrendale, PA 15086-7573 USA
Bulletin@mrs.org tel 724.779.2747 fax 724.779.8313 www.mrs.org

About the Materials Research Society

The Materials Research Society (MRS), a not-for-profit scientific association founded in 1973, promotes interdisciplinary goal-oriented basic research on materials of technological importance. Membership in the Society includes almost 16,000 scientists, engineers, and research managers from industrial, government, and university research laboratories in the United States and over 80 countries.

The Society's interdisciplinary approach differs from that of single-discipline professional societies because it promotes information exchange across the many technical fields touching materials development. MRS sponsors three major international annual meetings encompassing approximately 125 topical symposia, and also sponsors numerous single-topic scientific meetings. The Society recognizes professional and technical excellence and fosters technical interaction in local geographic regions through Sections and University Chapters.

MRS participates in the international arena of materials research through the International Union of Materials Research Societies (IUMRS). MRS is a member of the Alliance for Science & Technology Research in America and is an affiliate of the American Institute of Physics.

MRS publishes the *MRS Online Proceedings Library*, *MRS Bulletin*, *Journal of Materials Research*, *MRS Communications*, and other publications related to current research activities.

Editor
Gopal R. Rao, rao@mrs.org

Managing Editor
Judy Meiksin, meiksin@mrs.org

Technical Editor
Lori A. Wilson, lwilson@mrs.org

Editorial Assistants
Ben Moriarty, moriarty@mrs.org
Mary Wilmoth

Associate Technical Editor
Carol Tseng

Art Director
Kasia M. Bruniany

Production/Design
Andrea Pekelnicky, Rebecca Yokum, and TNQ

Production Editor
Catherine Paduani

Science News Editor
Tim Palucka

Principal Development Editor
Elizabeth L. Fleischer

Director of Communications
Eileen Kiley Novak

Guest Editors
Vitaly Podzorov and Wenping Hu

Special Contributors
B.V.R. Chowdari, Mark Jhon, Antonio Terrasi, and Evan L. Williams

Energy Quarterly
David Cahen (Chair), Anshu Bharadwaj, Russell R. Chianelli, George Crabtree, Anke Weidenkaff, M. Stanley Whittingham, and Steve M. Yalisove

Advertising/Sponsorship
Mary E. Kaufold, kaufold@mrs.org
Donna L. Watterson, watterson@mrs.org

Member Subscriptions
Michelle Judt, judt@mrs.org

Non-Member Subscriptions
subscriptions_newyork@cambridge.org

MRS Bulletin (ISSN: 0883-7694, print; ISSN 1938-1425, online) is published 12 times a year by the Materials Research Society, 506 Keystone Drive, Warrendale, PA 15086-7573. Periodical postage paid at New York, NY, and at additional mailing offices. POSTMASTER: Send address changes to *MRS Bulletin* in care of the Journals Department, Cambridge University Press, 100 Brook Hill Drive, West Nyack, NY 10994-2113, USA. Printed in the U.S.A.

Membership in MRS is $115 annually for regular members, $30 for students. Dues include an allocation of $29 ($17 for students) to a subscription to *MRS Bulletin*. Individual member subscriptions are for personal use only. Non-member subscription rates are $394 for one calendar year (12 issues) within North America and $479 elsewhere. Requests from subscribers for missing journal issues will be honored without charge only if received within six months of the issue's actual date of publication.

MRS Bulletin is included in Current Contents®/Engineering, Computing, and Technology; Current Contents®/Physical, Chemical, and Earth Sciences, the SciSearch® online database, Research Alert®, Science Citation Index®, and the Materials Science Citation Index™. Back volumes of *MRS Bulletin* are available on microfiche through University Microfilms Inc., 300 North Zeeb Road, Ann Arbor, MI 48106, USA.

Send Letters to the Editor to **Bulletin@mrs.org**. Include your name, affiliation, and full contact information.

https://doi.org/10.1557/mrs.2013.16 Published online by Cambridge University Press