

Organic Thin Films: An Overview

David G. Whitten, Tisato Kajiyama, and
Toyoki Kunitake, Guest Editors

The six articles comprising this issue of the *MRS Bulletin* deal with ultrathin films formed from organic molecules by a variety of techniques. In each case the component molecule forming the film is a relatively simple, single molecule which may or may not have important self-organizing properties that facilitate the formation of a film or related ordered molecular assembly. Taken together, the series of articles offer a concise look at the remarkable diversity and complexity of molecular thin films in terms of preparation and their properties.

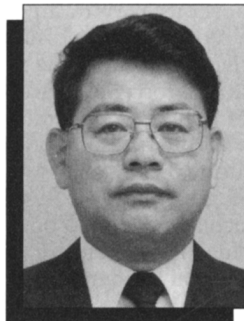
This issue is timely in view of the recent surge of interest and effort in this

area which has been stimulated by the many promising applications for new devices and materials based on thin films, and by the new methods emerging for preparation and characterization of the films. By surveying such diverse methods of preparation and different types of systems such as evaporated organic films (Matsushige), self-adsorbed monolayers (Ulman), Langmuir-Blodgett films (Kajiyama, Whitten et al., Okahata et al.) and lipid bilayers (Kunitake, Whitten et al.), the reader will obtain an overview of the techniques for preparing and characterizing these films as well as the potential applications and problems

related to their use. Some of the articles deal with the very important issues of homogeneity, and defect assessment and elimination, such as the article by Kajiyama. The articles by Okahata et al. and Kunitake focus on some of the novel applications that these films can offer in the domain of molecular recognition and biomimetic chemistry. Ulman's article emphasizes the versatile applications that are possible from the wide selection of component molecular structures used to form the self-assembled layers. Several of the articles emphasize the supramolecular aspects of these films in which either the total structure or some subset in a film or bilayer exhibits novel properties resulting from clustering or aggregation of the individual components. In several cases the formation of films or bilayers can be used to prepare supramolecular species or aggregates which cannot be prepared in conventional solids or solution environments (Whitten et al.). Taken together, the articles emphasize how these molecular thin films act as a bridge between the crystalline solids and solutions, and how they can be a useful medium from which to embark on a variety of applications. □

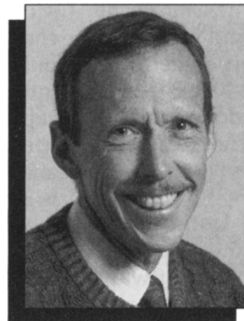
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David G. Whitten, Guest Editor for this issue of the *MRS Bulletin*, received an AB degree in chemistry from Johns Hopkins University, and MA and PhD degrees from the same institution. In 1983 he assumed his present position as C.E. Kenneth Mees Professor of Chemistry at the University of Rochester where he is also director of the National Science Foundation Center for Photoinduced Charge Transfer. His research interests include fundamental studies of photochemical reactivity, including electron-transfer reactions. Whitten can be reached at the Department of Chemistry, University of Rochester; Rochester, NY 14627; phone: 716-275-8286; fax: 716-473-6889; whitten@chem.chem.rochester.edu.



Tisato Kajiyama

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David G. Whitten

MEng degrees from Kyushu University and a PhD degree in chemistry from the University of Pennsylvania. Kunitake's current research interests are in the fields of polymer chemistry and bioorganic chemistry with concentrations in two-dimensional molecular organizations. Kunitake can be contacted at the Department of Chemical Science and Technology, Faculty of Engineering, Kyushu Uni-



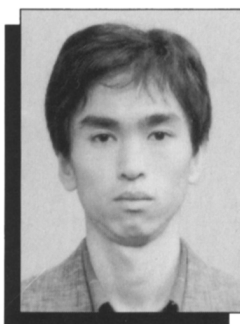
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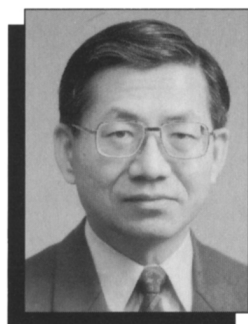
Huijuan Chen, Catie Weiss Farahat, Mohammad S. Farahat, H. Cristina Geiger, Uwe W. Leinhos, Kangning Liang, Xuedong Song, Thomas L. Penner, Jerry Perlstein, and Kock-Yee Law (graduate students, postdoctoral Fellows, and principal investiga-



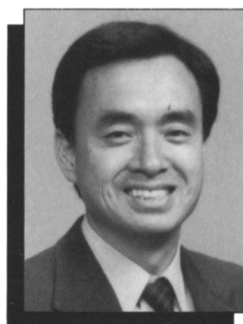
Whitten et al., starting from top left, clockwise: Mohammad S. Farahat, Xuedong Song, H. Cristina Geiger, Kangning Liang, Uwe W. Leinhos, Huijuan Chen, Catie Weiss Farahat, Jerry Perlstein, David G. Whitten, Thomas L. Penner (not pictured: Kock-Yee Law)



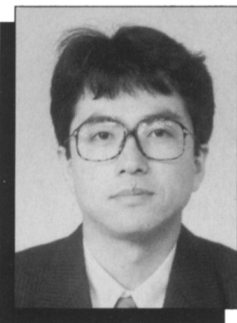
Yasuhito Ebara



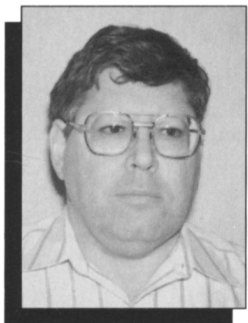
Kazumi Matsushige



Yoshio Okahata



Toshinori Sato



Abraham Ulman

place between university, Kodak, and Xerox representatives in the design and interpretation of systems in which aggregation of functionalized surfactants is demonstrated, and their photophysical and photochemical properties are influenced. Additional interests of the research group include study of photoinduced electron transfer and excited-state kinetics in ordered media.

Yasuhito Ebara received his PhD degree

from the Tokyo Institute of Technology under the supervision of Yoshio Okahata (see biography of Okahata in this section). He now serves as a research associate at the Tokyo Institute of Technology. His research interests include the use of a quartz-crystal microbalance for the molecular recognition and characterization of Langmuir-Blodgett films.

Kazumi Matsushige is a professor in the Department of Electrical and Electronic Engineering at Kyoto University. He received a BS degree in physics, and MS and DEng degrees in applied physics from Kyushu University, as well as a PhD degree in macromolecular science from Case Western Reserve University. Matsushige's present research combines interests in molecular science and electronics. He is the author or co-author of more than 250 papers and review articles, and was the recipient of the Award of the Society of Polymer Science, Japan in 1988.

Yoshio Okahata received his PhD degree from Kyushu University. He then served as a research associate and assistant professor at Kyushu. He spent 1980 and 1981 in the United States as a visiting

research associate at the University of Massachusetts and at the University of California at Irvine. He is now a professor at the Tokyo Institute of Technology. His research interests include molecular recognition through the use of a quartz-crystal microbalance, as well as DNA-lipid films and a lipid-coated enzyme.

Toshinori Sato received his PhD from Kyoto University. He became a research associate at Nagasaki University in 1983 and joined Kyoto University in 1992. He is now an associate professor at the Tokyo Institute of Technology. His research interests include the introduction of DNA and proteins in cells.

Abraham Ulman is the Alstadt-Lord-Mark Professor, Department of Chemistry and Polymer Research Institute, at the Polytechnic University (Six Metrotech Center, Brooklyn, NY 11201; phone: 718-260-3119; fax: 718-260-3125; e-mail: aulman@photon.poly.edu). His research interests include self-assembled monolayers, surface engineering and surface phenomena, polymers for extreme conditions, and metalloporphyrins. Ulman holds a PhD degree from the Weizmann Institute in Israel. □

tors) are members of the "organized media group" at the National Science Foundation Center for Photoinduced Charge Transfer (see

biography of Guest Editor David G. Whitten in this section), Rochester, New York. At the weekly meetings, active three-way discussions take

UPCOMING MRS MEETINGS:

Fall 1995	November 27 - December 1	Boston, Massachusetts
Spring 1996	April 8 - April 12	San Francisco, California
Fall 1996	December 2 - December 6	Boston, Massachusetts
Spring 1997	March 31 - April 4	San Francisco, California
Fall 1997	December 1 - December 5	Boston, Massachusetts