

dental materials

Editor-in-Chief

David C Watts PhD FADM, *University of Manchester School of Dentistry, Manchester, UK.*

E-mail: dentistry.dentmatj@manchester.ac.uk

North American Editor

Ronald Sakaguchi PhD FADM, *OHSU School of Dentistry, Portland OR, USA.*

E-mail: sakaguch@ohsu.edu

Editorial Advisor

Nick Silikas PhD FADM, *University of Manchester School of Dentistry, Manchester, UK.*

Editorial Assistant

Diana Knight, *University of Manchester School of Dentistry, Manchester, UK.*

E-mail: dentistry.dentmatj@manchester.ac.uk

Official Publication of the Academy of Dental Materials

Editorial Board

Joseph Antonucci
NIST Dental & Medical Materials, USA

Kenneth Anusavice
University of Florida, USA

Stephen Bayne
The University of Michigan, USA

Richard V. Curtis
GKT Dental Institute, London, UK

Brian Darvell
University of Hong Kong, CHINA

Alvaro Della Bona
University of Passo Fundo, BRAZIL

George Eliades
University of Athens, Athens, GREECE

Jack Ferracane
Oregon Health Sciences University, USA

Alex S.L. Fok
The University of Minnesota, USA

Per Olof Glantz
University of Lund, SWEDEN

Jason A. Griggs
The University of Mississippi, USA

Satoshi Imazato
Osaka University, JAPAN

Klaus Jandt
Friedrich-Schiller Universität Jena, GERMANY

Karl-Heinz Kunzelmann
Ludwig-Maximilians University of Munich, GERMANY

Paul Lambrechts
Katholieke Universiteit, Leuven, BELGIUM

Charles Lloyd
University of Dundee, UK

Ulrich Lohbauer
University of Erlangen-Nuremberg, Erlangen, GERMANY

Grayson W Marshall
University of California San Francisco, USA

Sally Marshall
University of California, San Francisco, USA

John McCabe
University of Newcastle Upon Tyne, UK

Bart van Meerbeek
Katholieke Universiteit, Leuven, BELGIUM

Takashi Miyazaki
Showa University, JAPAN

Yasuko Momoi
Tsurumi University, Yokohama, JAPAN

David Pashley
Medical College of Georgia, USA

John Powers
University of Texas at Houston, USA

Reinhard Hickel
Ludwig-Maximilians University, GERMANY

N. Dorin Ruse
University of British Columbia Vancouver, CANADA

Michael Swain
University of Sydney, AUSTRALIA

John E. Tibballs
Nordic Institute of Dental Materials, NORWAY

Pekka K. Vallittu
University of Turku, FINLAND

John C Wataha
Medical College of Georgia, USA

Nairn H F Wilson
GKT Dental Institute, London, UK

Huakun (Hockin) Xu
The University of Maryland Dental School, MD, USA

© 2009 by the Academy of Dental Materials, a non-profit organisation. All rights reserved.

Aims and Scope

The principal aim of *Dental Materials* is to promote rapid communication of scientific information between academia, industry, and the dental practitioner. Original manuscripts on clinical and laboratory research of basic and applied character which focus on the properties or performance of dental materials or the reaction of host tissues to materials are given priority for publication. Other acceptable topics include: application technology in clinical dentistry and dental laboratory technology. Comprehensive reviews and editorial commentaries on pertinent subjects will be considered. Only manuscripts that adhere to the highest scientific standards will be accepted. The Academy's objectives are: (1) to provide a forum for the exchange of information on all aspects of dental materials; (2) to enhance communication between industry, researchers and practising dentists; and (3) to promote dental materials through its activities.

Annual meetings and scientific sessions are held in conjunction with other dental organizations. The Academy sponsors symposia and scientific programs in international meetings; recognizes scholarship at all levels from students to senior scholars; and elects Fellows in the Academy. For a full and complete Guide for Authors, please go to <http://www.elsevier.com/locate/dema>

USA mailing notice: *Dental Materials* (ISSN 0109-5641) is published monthly by Elsevier Ltd. (The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK). Periodical postage paid at Rahway NJ and additional mailing offices.

USA POSTMASTER: Send change of address to *Dental Materials*, Elsevier Customer Service Department, 3251 Riverport Lane, Maryland Heights, MO 63043, USA.

AIRFREIGHT AND MAILING in USA by Mercury International Limited, 365, Blair Road, Avenel, NJ 07001.

Publication information: *Dental Materials* (ISSN 0109-5641). For 2009, volume 25 is scheduled for publication. Subscription prices are available on request from the Publisher or from the Elsevier Customer Service Department nearest you or from this journal's website (<http://www.intl.elsevierhealth.com/journals/dema>). Further information is available on this journal and other Elsevier products through Elsevier's website: (<http://www.elsevier.com>). Subscriptions are accepted on a prepaid basis only and are entered on a calendar year basis. Issues are sent by standard mail (surface within Europe, air delivery outside Europe). Priority rates are available upon request. Claims for missing issues should be made within six months of the date of dispatch.

Advertising Information: Advertising orders and enquiries can be sent to: **USA, Canada and South America:** Mr Tino DeCarlo, Advertising Department, Elsevier Inc., 360 Park Avenue South, New York, NY 10010-1710, USA; phone: (+1) (212) 633 3815; fax: (+1) (212) 633 3820; e-mail: t.decarlo@elsevier.com. **Europe and ROW:** Sarah Cahill, Advertising Sales Executive, Elsevier Ltd, 32 Jamestown Road, London NW1 7BY, UK. Phone: +44 (0) 207 424 4538; fax: +44 (0) 207 424 4433; e-mail: s.cahill@elsevier.com

Orders, claims, and journal enquiries: please contact the Elsevier Customer Service Department nearest you:

St. Louis: Elsevier Customer Service Department, 3251 Riverport Lane, Maryland Heights, MO 63043, USA; phone: (800) 6542452 [toll free within the USA]; (+1) (314) 4478871 [outside the USA]; fax: (+1) (314) 4478029; e-mail: JournalsCustomerService-usa@elsevier.com

Oxford: Elsevier Customer Service Department, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK; phone: (+44) (1865) 843434; fax: (+44) (1865) 843970; e-mail: JournalsCustomerServiceEMEA@elsevier.com

Tokyo: Elsevier Customer Service Department, 4F Higashi-Azabu, 1-Chome Bldg, 1-9-15 Higashi-Azabu, Minato-ku, Tokyo 106-0044, Japan; phone: (+81) (3) 5561 5037; fax: (+81) (3) 5561 5047; e-mail: JournalsCustomerServiceJapan@elsevier.com

Singapore: Elsevier Customer Service Department, 3 Killiney Road, #08-01 Winsland House I, Singapore 239519; phone: (+65) 63490222; fax: (+65) 67331510; e-mail: JournalsCustomerServiceAPAC@elsevier.com

Photocopying. Single photocopies of single articles may be made for personal use as allowed by national copyright laws. Permission of the Publisher and payment of a fee is required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and all forms of document delivery. Special rates are available for educational institutions that wish to make photocopies for non-profit educational classroom use.

For information on how to seek permission visit www.elsevier.com/permissions or call: (+44) 1865 843830 (UK) / (+1) 215 239 3804 (USA).

Derivative Works. Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution. Permission of the Publisher is required for all other

derivative works, including compilations and translations (please consult www.elsevier.com/permissions).

Electronic Storage or Usage. Permission of the Publisher is required to store or use electronically any material contained in this journal, including any article or part of an article (please consult www.elsevier.com/permissions). Except as outlined above, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the Publisher.

Notice. No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug dosages should be made. Although all advertising material is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer.

Author enquiries: For enquiries relating to the submission of articles (including electronic submission where available) please visit this journal's homepage at <http://www.elsevier.com/locate/dema>. You can track accepted articles at <http://www.elsevier.com/trackarticle> and set up e-mail alerts to inform you of when an article's status has changed. Also accessible from here is information on copyright, frequently asked questions and more.

Contact details for questions arising after acceptance of an article, especially those relating to proofs, will be provided by the publisher.

Funding body agreements and policies

Elsevier has established agreements and developed policies to allow authors whose articles appear in journals published by Elsevier, to comply with potential manuscript archiving requirements as specified as conditions of their grant awards. To learn more about existing agreements and policies please visit <http://www.elsevier.com/fundingbodies>

© The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper)

The item fee code for this publication is 0109-6641/\$ 36.00