

TENSIDE SURFACTANTS DETERGENTS

EDITOR-IN-CHIEF

Dr. rer. nat. Beatrix Föllner, Nettetal, Germany

ADVISORY BOARD

Dr. Zaid Amjad, Brecksville, OH, USA

Prof. Dr. Dirk Bockmühl, Kleve, Germany

Dr. Dieter Boeckh, Ludwigshafen, Germany

Prof. Dr. Dominique Carrière, Gif-sur-Yvette, France

Dr. Michael Dreja, Düsseldorf, Germany

Prof. Dr. Peter J. Hauser, Raleigh, NC, USA

Prof. Dr. Stefan Iglauer, Perth, Australia

Dr. Craig James, Cardiff, U.K.

Prof. Dr. Véronique Nardello-Rataj, Lille, France

Prof. Dr. William M. Nelson, Jefferson, AR, USA

Dr. Vijay Raghavan, Cleveland, OH, USA

Prof. Dr. Reinhard Schomäcker, Berlin, Germany

Prof. Dr. Rainer Stamminger, Bonn, Germany

Prof. Dr. Jie Song, Flint, MI, USA

Prof. Dr. Reinhard Strey, Köln, Germany

Prof. Dr. Cosima Stubenrauch, Stuttgart, Germany

DE GRUYTER

ABSTRACTED/INDEXED IN Baidu Scholar · Chemical Abstracts Service (CAS): CAPlus; SciFinder · CNKI Scholar (China National Knowledge Infrastructure) · CNPIEC: cnpLINKer · Dimensions · EBSCO Discovery Service · Google Scholar · J-Gate · Journal Citation Reports/Science Edition · KESLI-NDSL (Korean National Discovery for Science Leaders) · MyScienceWork · Naver Academic · Naviga (Softweco) · Primo Central (ExLibris) · ReadCube · SCImago (SJR) · SCOPUS · Semantic Scholar · Sherpa/RoMEO · Summon (ProQuest) · TDNet · WanFang Data · Web of Science: Current Contents/Physical, Chemical and Earth Sciences; Science Citation Index Expanded · WorldCat (OCLC) · X-MOL · Yewno Discover

The publisher, together with the authors and editors, has taken great pains to ensure that all information presented in this work (programs, applications, amounts, dosages, etc.) reflects the standard of knowledge at the time of publication. Despite careful manuscript preparation and proof correction, errors can nevertheless occur. Authors, editors and publisher disclaim all responsibility for any errors or omissions or liability for the results obtained from use of the information, or parts thereof, contained in this work. The citation of registered names, trade names, trademarks, etc. in this work does not imply, even in the absence of a specific statement, that such names are exempt from laws and regulations protecting trademarks etc. and therefore free for general use.

ISSN 0932-3414 · e-ISSN 2195-8564

TSD is the official journal of the Division Detergent Chemistry of the German Chemical Society (GDCh e.V.),
Postfach/P. O. Box 90 04 40, 60444 Frankfurt/Main, Germany, Tel.: +49 69 79171

All information regarding notes for contributors, subscriptions, Open access, back volumes and orders is available online at www.degruyter.com/tsd.

EDITOR-IN-CHIEF Dr. rer. nat. Beatrix Föllner, Am Kreuzberg 5, 41334 Nettetal, Germany,
Tel.: +49 2153 952540, Fax: +49 2153 952541, e-mail: tenside@degruyter.com

PUBLISHER Walter de Gruyter GmbH, Berlin/Boston, Genthiner Straße 13, 10785 Berlin, Germany

JOURNAL COORDINATOR Anne Weberling, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany,
Tel.: +49 30 260 05-421, Fax: +49 30 260 05-250, e-mail: anne.weberling@degruyter.com

RESPONSIBLE FOR ADVERTISEMENTS Markus Kügel, De Gruyter, Rosenheimer Str. 143, 81671 München, Germany,
Tel.: +49 89 76 902-424, e-mail: markus.kuegel@degruyter.com

© 2022 Walter de Gruyter GmbH, Berlin/Boston, Germany

TYPESETTING TNQ Technologies, Chennai, India

PRINTING druckhaus köthen GmbH & Co. KG, Köthen, Germany

COVER ILLUSTRATION Soap bubble; the iridescent colours are created due to the interference of light waves reflected from the front and back of the thin soap film. © Zoonar/Manfred Kirchner.

Contents

Novel Cleaning Concepts

Tamara Schad, Natalie Preisig, Heinrich Piening and Cosima Stubenrauch

Innovative foam-based cleaning concepts for historical objects — 451

Automatic Dishwashing

Scott A. Backer, Daria Monaenkova, Paul Mercado and Willian Heesch

Development of an imaging station and scoring model for automatic dishwashing evaluation — 460

Physical Chemistry

Igor Povar and Oxana Spinu

Thermodynamics of complex chemical equilibria in surfactant mixtures — 474

Jiang Yang, Xiaoyan Gao and Hailing Liu

Dispersion of copper phthalocyanine pigment nanoparticles by eco-friendly ethoxylated cardanol in aqueous solution — 485

Yuling Wang, Yue Liu, Binbin He, Jian Huang and Hujun Xu
Study on the compounding of sodium N-lauroyl glutamate and cationic cellulose — 492

Muhammad Usman, Saleem Raza, Hamadia Sultana, Zulfiqar Ali Raza, Muhammad Siddiq, Atta ul Haq, Fiza Bukhtawar, Sadia Younis and Samavia Rafiq
Interaction of Direct Blue 86 with cationic surfactant micelles: spectroscopic, conductometric and thermodynamic aspects — 501

Novel Surfactants

Ming Zhou, Xinyi Deng, Yiping Chen, Yaxiong Zhao, Ruifeng Ni and Jiangyu Huang

Oligomeric cationic Gemini surfactants: synthesis, surface activities and rheological properties as thickener — 511

Application

Samah M. El-Sayed, Samah S. Abdalla and Mohamed A. Abdel-Khalek

Influence of *Bacillus subtilis* on the surface behavior and separation of talc and chlorite minerals — 524