

HOLZFORSCHUNG

INTERNATIONAL JOURNAL OF THE BIOLOGY, CHEMISTRY,
PHYSICS AND TECHNOLOGY OF WOOD

EDITOR-IN-CHIEF

Oskar Faix, Germany

EDITORIAL BOARD

G. Daniel, Sweden
H. Miltz, Germany
T. Rosenau, Austria

L. Salmén, Sweden
H. Sixta, Austria
T. Vuorinen, Finland

ADVISORY BOARD

D.S. Argyropoulos, USA
M.Y. Balakshin, Canada
J. Barnett, UK
I. Burgert, Germany
D.V. Evtuguin, Portugal
C.E. Frazier, USA
K. Fukushima, Japan
W. Gindl-Altmatter, Austria
W.G. Glasser, USA
B. Holmbom, Finland
A. Isogai, Japan
J.F. Kadla, Canada
G. Koch, Germany
D. Lachenal, France
C. Laine, Finland
S.D. Mansfield, Canada
J.J. Morrell, USA

P. Niemz, Switzerland
A. Potthast, Austria
A.J. Ragauskas, USA
J. Ralph, USA
R.W. Rice, USA
J. del Rio, Spain
J.-G. Salin, Finland
U. Schmitt, Germany
T.P. Schultz, USA
J. Sipilä, Finland
T. Takano, Japan
T. Tamminen, Finland
H. Theliander, Sweden
J. Welling, Germany
S.M. Willför, Finland
H. Yoshihara, Japan

DE GRUYTER

ABSTRACTED/INDEXED IN AGRICOLA (National Agricultural Library); Baidu Scholar; CABI (over 50 subsections); Celdes; Chemical Engineering and Biotechnology Abstracts; CNKI Scholar (China National Knowledge Infrastructure); CNPIEC; EBSCO (relevant databases); EBSCO Discovery Service; Elsevier: BIOBASE/CABS (Current Awareness in Biological Sciences); Compendex; Engineering Village; PaperChem; SCOPUS; Gale/Cengage; Genamics JournalSeek; Google Scholar; Inspec; J-Gate; JournalTOCs; Naviga (Softweco); Paperbase; Pirabase; Polymer Library; Primo Central (ExLibris); ProQuest (relevant databases); PubsHub; ReadCube; ResearchGate; SCImago (SJR); Summon (Serials Solutions/ProQuest); TDOne (TDNet); TEMA Technik und Management; Thomson Reuters: Current Contents/Agriculture, Biology, and Environmental Sciences; Journal Citation Reports/Science Edition; Science Citation Index; Science Citation Index Expanded; Ulrich's Periodicals Directory/ulrichsweb; WorldCat (OCLC)

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 0018-3830 · e-ISSN1437-434X · CODENHOLZAZ

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

RESPONSIBLE EDITOR(S) Prof. Dr. Oskar Faix, Kornblumenweg 12, 21509 Glinde/Germany, Tel.: 040 7110866, Email: o.faix@holz.uni-hamburg.de

JOURNAL MANAGER Ingrid Grünberg, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany, Tel.: +49 (0)30 260 05 – 245, Fax: +49 (0)30 260 05 – 325, Email: Holzforschung.editorial@degruyter.com

RESPONSIBLE FOR ADVERTISEMENTS Claudia Neumann, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany, Tel.: +49 (0)30 260 05 – 226, Fax: +49 (0)30 260 05 – 264, Email: anzeigen@degruyter.com

© 2017 Walter de Gruyter GmbH, Berlin/Boston

TYPESETTING Compuscript Ltd., Shannon, Ireland

PRINTING Franz X. Stücker Druck und Verlag e.K., Ettenheim
Printed in Germany

COVER ILLUSTRATION Richter, H.G., and Dallwitz, M.J. 2000 onwards. Commercial timbers: descriptions, illustrations, identification, and information retrieval. In English, French, German, Portuguese, and Spanish. Version: 25th June 2009. <http://delta-intkey.com>



Offenlegung der Inhaber und Beteiligungsverhältnisse gem. § 7a Abs. 1 Ziff. 1, Abs. 2 Ziff. 3 des Berliner Pressegesetzes: Die Gesellschafter der Walter de Gruyter GmbH sind: Cram, Gisela, Rentnerin, Berlin; Cram, Elsbeth, Pensionärin, Rosengarten-Alvesen; Cram, Dr. Georg-Martin, Unternehmens-Systemberater, Stadtbergen; Cram, Maike, Wien (Österreich); Cram, Jens, Mannheim; Cram, Ingrid, Betriebsleiterin, Tuxpan/Michoacan (Mexiko); Cram, Sabina, Mexico, DF (Mexiko); Cram, Silke, Wissenschaftlerin, Mexico DF (Mexiko); Cram, Björn, Aachen; Cram, Cram, Berit, Hamm; Cram-Gomez, Susana, Mexico DF (Mexiko); Cram-Heydrich, Walter, Mexico DF (Mexico); Cram-Heydrich, Kurt, Angestellter, Mexico DF (Mexico); Duvenbeck, Brigitta, Oberstudienrätin i.R., Bad Homburg; Gädeke, Gudula, M.A., Atemtherapeutin/Lehrerin, Tübingen; Gädeke, Martin, Einzelunternehmer, Ingolstadt; Lubasch, Dr. Annette, Ärztin, Berlin; Schütz, Dr. Christa, Ärztin, Mannheim; Schütz, Sonja, Berlin; Schütz, Juliane, Berlin; Schütz, Antje, Berlin; Schütz, Valentin, Mannheim; Seils, Dorothee, Apothekerin, Stuttgart; Seils, Gabriele, Journalistin, Berlin; Seils, Christoph, Journalist, Berlin; Siebert, John-Walter, Pfarrer, Oberstenfeld; Tran, Renate, Mediatorin, Zürich (Schweiz).

Contents

Original Articles

Hani Sitti Nuroniah, Oliver Gailing and Reiner Finkeldey
Development of a diagnostic DNA marker for the geographic origin of *Shorea leprosula* — 1

Deded Sarip Nawawi, Takuya Akiyama, Wasrin Syafii and Yuji Matsumoto
Characteristic of β -O-4 structures in different reaction wood lignins of *Eusideroxylon zwageri* T. et B. and four other woody species — 11

Juan Tao, Takao Kishimoto, Masahiro Hamada and Noriyuki Nakajima
Enzymatic synthesis of methyl β -D-glucoside directly from cellulose pretreated with biocompatible amino acid ionic liquid/cosolvent — 21

Miao Wang, Elisabeth Sjöholm and Jiebing Li
Fast and reliable quantification of lignin reactivity via reaction with dimethylamine and formaldehyde (Mannich reaction) — 27

Dominik Schmitt, Carolin Regenbrecht, Moritz Schubert, Dieter Schollmeyer and Siegfried R. Waldvogel
Treatment of black liquor (BL) by adsorption on AE resins and a subsequent electrochemical degradation of BL to obtain vanillin — 35

Song Yi Han, Chan-Woo Park, Nam-Hun Kim and Seung-Hwan Lee

Co-solvent system of [EMIM]Ac and DMF to improve the enzymatic saccharification of pussy willow (*Salix gracilistyla* Miq.) — 43

Fuli Wang, Tianlai Huang and Zhuoping Shao
Application of TTSP to wood-development of a vertical shift factor — 51

Miha Humar, Davor Kržišnik, Boštjan Lesar, Nejc Thaler, Aleš Ugovšek, Klemen Zupančič and Mojca Žlahtič
Thermal modification of wax-impregnated wood to enhance its physical, mechanical, and biological properties — 57

Laura Bergamonti, Alessia Berzolla, Elisabetta Chiappini, Elisabetta Feci, Lara Maistrello, Sabrina Palanti, Giovanni Predieri and Giacomo Vaccari
Polyamidoamines (PAAs) functionalized with siloxanes as wood preservatives against fungi and insects — 65

Maria Fredriksson and Lisbeth Garbrecht Thygesen
The states of water in Norway spruce (*Picea abies* (L.) Karst.) studied by low-field nuclear magnetic resonance (LFNMR) relaxometry: assignment of free-water populations based on quantitative wood anatomy — 77