

**MATERIALS RESEARCH SOCIETY  
SYMPOSIUM PROCEEDINGS VOLUME 1718**

# **Multifunctional Polymeric and Hybrid Materials**

November 30 – December 5, 2014  
Boston, Massachusetts, USA

Printed from e-media with permission by:

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

ISBN: 978-1-5108-5842-8

Some format issues inherent in the e-media version may also appear in this print version.

©Materials Research Society 2015

This reprint is produced with the permission of the Materials Research Society and Cambridge University Press.

This publication is in copyright, subject to statutory exception and to the provisions of relevant collective licensing agreements. No reproduction of any part may take place without the written permission of Cambridge University Press.

Cambridge University Press  
Cambridge, New York, Melbourne, Madrid, Cape Town,  
Singapore, São Paulo, Delhi, Tokyo, Mexico City

Cambridge University Press  
32 Avenue of the Americas, New York, NY 10013-2473, USA  
[www.cambridge.org](http://www.cambridge.org)

Materials Research Society  
506 Keystone Drive, Warrendale, PA 15086  
[www.mrs.org](http://www.mrs.org)

CODEN: MRSPDH

ISBN: 978-1-5108-5842-8

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-part Internet Web sites referred to in this publication and does not guarantee that any content on such Web sites is, or will remain, accurate or appropriate.

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## **CONTENTS**

<b>Preface .....</b>	<b>ix</b>
<b>Materials Research Society Symposium Proceedings.....</b>	<b>.xi</b>

### ***MULTIFUNCTIONAL COMPOSITES***

<b>Thermal, Mechanical and Magneto-mechanical Characterization of Liquid Crystalline Elastomers Loaded with Iron Oxide Nanoparticles .....</b>	<b>3</b>
--	----------

Stephany Herrera-Posada, Barbara O. Calcagno,  
and Aldo Acevedo

<b>Anisotropic Composites of Desaminotyrosine and Desaminotyrosyl Tyrosine Functionalized Gelatin and Bioactive Glass Microparticles .....</b>	<b>9</b>
--	----------

Konstanze K. Julich-Gruner, Andreas Lendlein,  
Aldo R. Boccaccini, and Axel T. Neffe

<b>Potential of Polarized PVDF/Carbon Nanotube Nanocomposite Scaffolds for Cell Growth .....</b>	<b>15</b>
--	-----------

Jun Young Lim, Sook Young Park, Hyun Jeong Kim, and  
Yongsok Seo

<b>Molecular Disorder in Prestrained Nanocomposites: Effects of Processing on Durability of Thermally-active Ethylene-vinyl Acetate   PyChol   Multiwall Carbon Nanotubes .....</b>	<b>21</b>
---	-----------

Allen D. Winter, Cherno Jaye, Daniel Fischer,  
Maria Omastová, and Eva M. Campo

<b>Investigating Thiol-epoxy Composites for Semiconductor Die Attach Adhesives .....</b>	<b>27</b>
--	-----------

Andrew Wei, Radu Reit, and Walter Voit

## ***STIMULI-SENSITIVE POLYMERS AND GELS***

- Systematic Study on the Remote Triggering of Thermo-responsive Hydrogels using RF Heating of Fe<sub>3</sub>O<sub>4</sub> Nanoparticles .....**35

Daniel Denmark, Devajyoti Mukherjee, Janae Bradley,  
Sarah Witanachchi, and Pritish Mukherjee

- Relation-between Nanostructural Changes and Macroscopic Effects during Reversible Temperature-memory Effect under Stress-free Conditions in Semicrystalline Polymer Networks .....**41

Ulrich Nöchel, Karl Kratz, Marc Behl, and Andreas Lendlein

- Photo-reversibility of Cinnamylidene Acetic Acid Derived Crosslinks in Poly( $\epsilon$ -caprolactone) Networks .....**49

Florian Störmann, Christian Wischke, and Andreas Lendlein

- Branched Amphiphilic Polysulfides: Influence of Macromolecular Architecture on Self-assembly and Oxidation Responsiveness .....**55

Richard d'Arcy and Nicola Tirelli

- Modelling and Analysis of pH Responsive Hydrogels for the Development of Biomimetic Photo-actuating Structures .....**65

Michael P.M. Dicker, Ian P. Bond, Jonathan M. Rossiter,  
Charl F.J. Faul, and Paul M. Weaver

- Thermally Controlled Shape-memory Investigations of Nanocomposites based on Oligo( $\omega$ -pentadecalactone) and Magnetic Nanoparticles Acting as Crosslinks .....**71

Muhammad Yasar Razzaq, Marc Behl, and Andreas Lendlein

## ***CHARACTERIZATION OF MULTIFUNCTIONAL POLYMER SYSTEMS***

- Biohybrid Fibro-porous Vascular Scaffolds: Effect of Crosslinking on Properties .....**79

Vinoy Thomas, Danna Nozik, Harsh Patel, Raj K. Singh,  
and Yogesh K. Vohra

**Purity of Mushroom Tyrosinase as a Biocatalyst for Biomaterial Synthesis Affects the Stability of Therapeutic Peptides ..... 85**

Miroslava Racheva, Oscar Romero,  
Konstanze K. Julich-Gruner, Anne S. Ulrich,  
Christian Wischke, and Andreas Lendlein

**Cationic Cellulose Nanocrystals: Synthesis, Characterization and Cytotoxicity Studies ..... 91**

Rajesh Sunasee, Usha D. Hemraz, Karina Ckless,  
James S. Burdick, and Yaman Boluk

**Immuno-compatibility of Desaminotyrosine and Desaminotyrosyl Tyrosine Functionalized Star-shaped Oligo(ethylene glycol)s with Different Molecular Weights ..... 97**

Toralf Roch, Konstanze K. Julich-Gruner, Axel T. Neffe,  
Nan Ma, and Andreas Lendlein

**Influence of Glycidymethacrylate Functional Groups Attached to Gelatin on the Formation and Properties of Hydrogels ..... 103**

Candy Löwenberg, Konstanze K. Julich-Gruner,  
Axel T. Neffe, and Andreas Lendlein

**Robot Assisted Synthesis and Characterization of Polyester-based Polyurethanes ..... 109**

Stefan Baudis, Andreas Lendlein, and Marc Behl

**The Use of MRI as a Technique for Hydrophilic Polymer Swelling Characterization ..... 117**

Michaela Gajdošová, Nina Sarvašová, Daniel Pěček,  
and František Štěpánek

**Thermomechanical Characterization of a Series of Crosslinked Poly[ethylene-co-(vinyl acetate)] (PEVA) Copolymers ..... 123**

Matthias Heuchel, Laith Al-Qaisi, Karl Kratz,  
Ulrich Nöchel, Marc Behl, and Andreas Lendlein

<b>Poly(<i>n</i>-butylcyanoacrylate) Nanoparticles as Carriers for Adenosine Triphosphate.....</b>	131
--	-----

Christian Wischke, Judith Weigel, and Andreas Lendlein

#### ***STRUCTURED SURFACES AND MULTILAYERED POLYMERS***

<b>Using Lasers to Create Metal-polyimide Films with Alternating Layers .....</b>	139
---	-----

Folasadé Faulkner and Brent Koplitz

<b>A Robust Multilayer Dielectric Elastomer Actuator .....</b>	145
--	-----

Mason A. Wolak and Lei Zhu

<b>Nanofiber-based Membrane Separators for Lithium-ion Batteries .....</b>	157
--	-----

Mataz Alcoutlabi, Hun Lee, and Xiangwu Zhang

<b>Fabrication of Silk Microstructures using Photolithography.....</b>	163
--	-----

Ramendra K. Pal, Nicholas E. Kurland, Subhas C. Kundu,  
and Vamsi K. Yadavalli

<b>Author Index .....</b>	171
---------------------------	-----

<b>Subject Index .....</b>	173
----------------------------	-----