
The combination of ionic liquids and polymers has emerged as an active field of exploration in polymer science, where new materials have been realized for various applications in energy, health and other fields, including batteries, capacitors, fuel cells, actuators, carbon dioxide capture, catalysis, and gene vectors. The purpose of this symposium is to highlight recent advances and current challenges in this field.

14. ABSTRACT
ACS Symposium: Ionic Liquids in Polymer Design: From Energy to Health at Fall 2015 ACS Meeting in Boston, MA

15. SUBJECT TERMS
ionic liquid, polymer

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Report Title

ABSTRACT
ACS Symposium: Ionic Liquids in Polymer Design: From Energy to Health
at Fall 2015 ACS Meeting in Boston, MA

The combination of ionic liquids and polymers has emerged as an active field of exploration in polymer science, where new materials have been realized for various applications in energy, health and other fields, including batteries, capacitors, fuel cells, actuators, carbon dioxide capture, catalysis, and gene vectors. The purpose of this symposium is to identify and highlight emerging materials that combine ionic liquids and polymer chemistry and the unique properties that arise from this combination. This symposium covers all aspects of ionic liquids in polymers from synthesis, properties, and applications. The research should be fundamental in nature, focused on understanding the physical and chemical mechanisms that control the material properties, microstructure, and resulting performance. Both experimental and computational research are welcome. Submissions are encouraged from national laboratories, government agencies, industry, and academia.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

Received Paper

TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

Received Paper

TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations
Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received  
Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received  
Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received  
Paper

TOTAL:

Number of Manuscripts:

Books

Received  
Book

TOTAL:
### Patents Submitted

### Patents Awarded

### Awards

#### Graduate Students

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#### Names of Post Doctorates

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#### Names of Faculty Supported

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#### Names of Under Graduate students supported

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**Student Metrics**
This section only applies to graduating undergraduates supported by this agreement in this reporting period

- The number of undergraduates funded by this agreement who graduated during this period: ..... 0.00
- The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields: ..... 0.00
- The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields: ..... 0.00
- Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale): ..... 0.00
- Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering: ..... 0.00
- The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense: ..... 0.00
- The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: ..... 0.00

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**Names of Personnel receiving masters degrees**

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**Names of personnel receiving PHDs**

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**Names of other research staff**

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**Sub Contractors (DD882)**

**Inventions (DD882)**

**Scientific Progress**

This grant provided travel/registration assistance for invited speakers for a symposium “Ionic Liquids in Polymer Design: From Energy to Health,” which was held on August 16-18, 2015 at the 2015 American Chemical Society National Meeting through the POLY division at Boston, Massachusetts. This symposium was organized by Yossef A. Elabd (Texas A&M University), Timothy Long (Virginia Tech), and Jiayin Yuan (Max Plank Institute).

**Technology Transfer**
Innovation from Discovery to Application

Ionic Liquids in Polymer Design: From Energy to Health

Co-Organizers: Timothy Long, Virginia Tech
Yossef Elabd, Texas A&M University
Jiayin Yuan, Max Planck Institute of Colloids and Interfaces, Potsdam

250th ACS National Meeting & Exposition

Boston, Massachusetts  August 18-20, 2015
Location: Grand Blrm E - Westin Boston Waterfront

Session overview
1. Polymerized ionic liquids
2. Synthesis and Processing
3. Structure-Property Relationships
4. New materials and emerging Applications
5. Energy and Environmental Applications

Tue, Aug. 18, 1:00 – 4:05pm
Session 1. Polymerized ionic liquids (chairman: Hiroyuki Ohno+Yossef A. Elabd)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>1:00-1:05pm</td>
<td>Introduction</td>
<td><strong>Timothy E. Long</strong></td>
</tr>
<tr>
<td>1:05-1:45pm</td>
<td>Innovative Poly(ionic liquids) for Energy and Environment</td>
<td><strong>David Mecerreyes</strong>, MEHMET ISIK, Ana Margarida Fernandes, Ali Aboudzadeh</td>
</tr>
<tr>
<td>1:45-2.10pm</td>
<td>New materials from polymerized ionic liquids</td>
<td><strong>John Texter</strong></td>
</tr>
<tr>
<td>2:10-2:35</td>
<td>Reactive Poly(ionic liquid)s (PILs) and Precision Synthesis of PIL-Based Nanostructures</td>
<td><strong>Daniel Taton</strong>, Paul Coupillaud, Joan Vignolle, Mathilde Weiss-Maurin, David Mecerreyes, Christophe Detrembleur</td>
</tr>
<tr>
<td>2:35-2:50pm</td>
<td>break</td>
<td><strong>Hiroyuki Ohno</strong></td>
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<tr>
<td>2.50-3:15pm</td>
<td>Polymerized ionic liquids: from ion conductive materials to water pump</td>
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<tr>
<td>3:15-3:40pm</td>
<td>3D Printing Phosphonium Ionic Liquid Networks with Mask Projection Microstereolithography</td>
<td><strong>Alison Schultz</strong>, Philip Lambert, Nicholas Chartrain, David Ruohoniemi, Zhiyang Zhang, Chainika Jangu, Musan Zhang, Christopher Williams, Timothy E. Long</td>
</tr>
<tr>
<td>3:40-4.05pm</td>
<td>Organometallic-Mediated Radical Polymerization for the precision design of novel poly(ionic liquid) copolymers in water</td>
<td><strong>Daniela Cordella</strong>, Anthony Kermagoret, Antoine Debuigne, Daniel Taton, David Mecerreyes, Christine Jérôme, Christophe Detrembleur</td>
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</table>
## Wed, Aug. 19, 8:00 – 11:00am
Session 2. Synthesis and Processing (chairman: Karen Winey + Wolfgang Binder)

<table>
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<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tr>
<td>8:00-8:40am</td>
<td>Functional Ion Gels</td>
<td><strong>Timothy P. Lodge</strong></td>
</tr>
<tr>
<td>8:40-9:05am</td>
<td>Protein Dissolution and Properties in Neat Ionic Liquids.</td>
<td><strong>Stephen Strassburg</strong>, Harry Bermudez, David A. Hoaglan</td>
</tr>
<tr>
<td>9:05-9:30am</td>
<td>Synthesis of Poly(ionic liquid)s by RAFT Polymerization and Poly(ionic liquid)/Guar/Ionic liquid Ionogels Thereof</td>
<td><strong>Biao Zhang</strong>, Anatoli Serghei, Guillaume Sudre, Aurélia Charlot, Julien BERNARD, Etienne Fleury</td>
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<tr>
<td>9:30-9:45am</td>
<td>break</td>
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<tr>
<td>9:45-10:10am</td>
<td>Reprocessing and recycling of highly cross-linked ion-conducting networks through transalkylation exchanges of C-N bonds</td>
<td><strong>Mona Obadia</strong>, Eric Drockenmuller, Damien Montarnal</td>
</tr>
<tr>
<td>10:35-11:00am</td>
<td>Ionic Liquids as Nonvolatile Media for the Study of Soft Matter Dynamics by In Situ Electron Microscopy</td>
<td><strong>David A. Hoagland</strong>, Paul Y. Kim, Thomas P. Russell, Alexander Ribbe</td>
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</tbody>
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## Wed, Aug. 19, 1:00 – 4:00pm
Session 2. Structure-Property Relationships (chairman: Ralph H. Colby +Timothy E. Long)

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<th>Time</th>
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<tbody>
<tr>
<td>1:00-1:40pm</td>
<td>Mesoscale-Structuring of Polymeric Ionic Liquids</td>
<td>Folikumah Makafui, Clement Appiah, Parvin Zare, Anja Stojanovic-Marinow, Frieder Kremer, <strong>Wolfgang H. Binder</strong></td>
</tr>
<tr>
<td>1:40-2.05pm</td>
<td>Molecular Weight Effects on Ionic Conductivity in Diblock Copolymer/Ionic Liquid Mixtures</td>
<td><strong>Karen I. Winey</strong></td>
</tr>
<tr>
<td>2:05-2:30</td>
<td>Conductivity Scaling Relationships in Nanostructured Membranes based on Protic Polymerized Ionic Liquids</td>
<td><strong>Rachel A. Segalman</strong>, Gabriel Sanoja, Christopher M. Evans, Bryan Beckingham, Yanika Schneider</td>
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<td>2:30-2:45pm</td>
<td>break</td>
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<tr>
<td>2:45-3:10pm</td>
<td>Dynamics of Polymerized Ionic Liquids and their Monomers</td>
<td>U Hyeok Choi, ANUJ MITTAL, Terry Price, Harry W. Gibson, James P. Runt, <strong>Ralph H. Colby</strong></td>
</tr>
<tr>
<td>3:10-3:35pm</td>
<td>1,2,3-Triazolium-based poly(ionic liquid)s: a new class of functional ion conducting materials</td>
<td><strong>Eric Drockenmuller</strong></td>
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<tr>
<td>3:35-4.00pm</td>
<td>Cholinium based ion gels: Preparation, characterization and application as electrolyte for long-term cutaneous recordings</td>
<td><strong>MEHMET ISIK</strong>, Esma Ismailova, Thomas Lonjaret, Rebeca Marcilla, George Malliaras, David Mecerreyes</td>
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### Thu, Aug. 20, 8:00 – 11:00am
Session 4. New materials and emerging Applications (chairman: David Mecerreyes + John Texter)

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<th>Time</th>
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<tr>
<td>8:00-8:40am</td>
<td>Ionic Liquids Inspiring the Design of Phosphonium-Containing Polymers: From 3D Printed Objects to Block Copolymer Elastomers</td>
<td>Sean Hemp, Ryan J. Mondschein, Chainika Jangu, Alison Schultz, Nicholas Chartrain, Christopher Williams, Timothy E. Long</td>
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<tr>
<td>8:40-9:05am</td>
<td>Evolution of Cyclopropenium Cations into Functional Polyelectrolytes</td>
<td>Jessica Freyer</td>
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<tr>
<td>9:05-9:30am</td>
<td>Multi-responsive porous polymer actuators: a matter of speed and sensitivity</td>
<td>Huijuan Lin, Qiang Zhao, Jiayin Yuan</td>
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<td>9:30-9:45am</td>
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<tr>
<td>9:45-10:10am</td>
<td>Imidazolium-containing ABA triblock copolymers for electroactive devices</td>
<td>Evan Margaretta, Gregory B. Fahs, David Inglefield, Chainika Jangu, Zhiyang Zhang, Dong Wang, James Heflin, Robert B. Moore, Timothy E. Long</td>
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<tr>
<td>10:10-10:35am</td>
<td>Polymeric Ionic Networks: Synthesis and Application in Catalysis</td>
<td>Pengfei Zhang, Xueguang Jiang, Sheng Dai</td>
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<tr>
<td>10:35-11:00am</td>
<td>Thermoresponsive Ionic Liquids and Their Polymers: Design and Potential Applications</td>
<td>Yuki Kohno, Hiroyuki Ohno</td>
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### Thu, Aug. 20, 1:00 – 4:05pm
Session 5. Energy and Environmental Applications (chairman: Jiayin Yuan + Daniel Taton)

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<tr>
<td>1:00-1:40pm</td>
<td>Polymerized ionic liquid block copolymers as anion exchange membranes</td>
<td>Yossef A. Elabd</td>
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<tr>
<td>1:40-2.05pm</td>
<td>Ionic liquid containing sulfonated block copolymer membranes</td>
<td>Evan Margaretta, Mingtao Chen, Richard M. Abrahamson, Timothy E. Long</td>
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<tr>
<td>2:05-2:30</td>
<td>Polymer design of sterically-protected anion exchange membrane</td>
<td>Andrew Wright, Steven Holdcroft</td>
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<td>2:30-2:45pm</td>
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<tr>
<td>2.45-3.10pm</td>
<td>Efficient Removal of Toxic Cationic Dyes from Wastewater using Disulfide-linked Porous Polymer Networks</td>
<td>Mehmet Sahin ATAS, Halit Cavusoglu, Aysenur Ozkaya, Mustafa Selman Yavuz</td>
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<tr>
<td>3:10-3:35pm</td>
<td>Imidazolium- and Triazolium-Containing Polyester Networks as Ion-Selective Electrode Membranes</td>
<td>R. D. Johnson, Kevin M. Miller</td>
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<tr>
<td>3:35-4.00pm</td>
<td>Synthesis of Nanoporous Asymmetric Poly(ionic liquid) Membranes</td>
<td>Qiang Zhao, Karoline Taeuber, Jiayin Yuan</td>
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<tr>
<td>4:00-4:05pm</td>
<td>Conclusion</td>
<td>Jiayin Yuan</td>
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