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14. 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 sensors. The purpose of this symposium					
15. SUBJECT TERMS ionic liquid, polymer					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Yossef Elabd
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## Report Title

Final Report: Ionic Liquids in Polymer Design: From Energy to Health

### 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 be 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.

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**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)**

<u>Received</u>	<u>Paper</u>
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**TOTAL:**

**Number of Papers published in peer-reviewed journals:**

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

<u>Received</u>	<u>Paper</u>
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**TOTAL:**

**Number of Papers published in non peer-reviewed journals:**

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**(c) Presentations**

Number of Presentations: 0.00

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

Received      Paper

**TOTAL:**

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

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

Received      Paper

**TOTAL:**

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

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**(d) Manuscripts**

Received      Paper

**TOTAL:**

Number of Manuscripts:

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**Books**

Received      Book

**TOTAL:**

TOTAL:

Patents Submitted

Patents Awarded

Awards

Graduate Students

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Post Doctorates

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Faculty Supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Under Graduate students supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

### 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

### Names of Personnel receiving masters degrees

NAME

**Total Number:**

### Names of personnel receiving PHDs

NAME

**Total Number:**

### Names of other research staff

NAME

PERCENT SUPPORTED

**FTE Equivalent:**

**Total Number:**

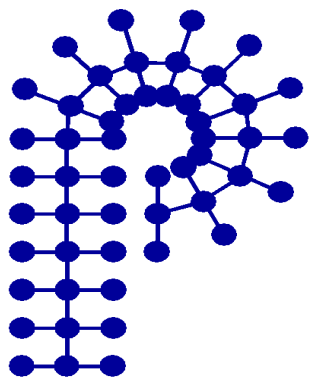
### Sub Contractors (DD882)

### 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

**250<sup>th</sup> 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)

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

**Wed, Aug. 19, 8:00 – 11:00am**

Session 2. Synthesis and Processing (chairman: Karen Winey + Wolfgang Binder)

Time	Title	Speaker(s)
8:00-8:40am	Functional Ion Gels	<b>Timothy P. Lodge</b>
8:40-9:05am	Protein Dissolution and Properties in Neat Ionic Liquids.	<b>Stephen Strassburg</b> , Harry Bermudez, David A. Hoaglan
9:05-9:30am	Synthesis of Poly(ionic liquid)s by RAFT Polymerization and Poly(ionic liquid)/Guar/Ionic liquid Ionogels Thereof	<b>Biao Zhang</b> , Anatoli Serghei, Guillaume Sudre, Aurélia Charlot, Julien BERNARD, Etienne Fleury
9:30-9:45am	break	
9:45-10:10am	Reprocessing and recycling of highly cross-linked ion-conducting networks through transalkylation exchanges of C-N bonds	<b>Mona Obadia</b> , Eric Drockenmuller, Damien Montarnal
10:10-10:35am	Ionic Liquid Microemulsions for Directing the Assembly and Morphology of Cellulose Nanoparticles.	<b>Jeffrey R. Alston</b> , Andrew Guenther, Joseph M. Mabry
10:35-11:00am	Ionic Liquids as Nonvolatile Media for the Study of Soft Matter Dynamics by In Situ Electron Microscopy	<b>David A. Hoagland</b> , Paul Y. Kim, Thomas P. Russell, Alexander Ribbe

**Wed, Aug. 19, 1:00 – 4:00pm**

Session 2. Structure-Property Relationships (chairman: Ralph H. Colby + Timothy E. Long)

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



**Thu, Aug. 20, 8:00 – 11:00am**

Session 4. New materials and emerging Applications (chairman: David Mecerreyes + John Texter)

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

**Thu, Aug. 20, 1:00 – 4:05pm**

Session 5. Energy and Environmental Applications (chairman: Jiayin Yuan + Daniel Taton)

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