

# AVNI A. ARGUN

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## EDUCATION

### Ph.D. in Chemistry

Department of Chemistry, University of Florida, Gainesville, Florida (GPA: 3.96/4.00)  
Advisor: Professor John R. Reynolds  
Dissertation Title: "Patterning of Conjugated Polymers for Electrochromic Devices"

December 2004

### B.S. in Chemistry

Department of Chemistry, Bilkent University - Ankara, Turkey (GPA: 3.33/4.00)

June 1999

## RESEARCH

### Post Doctoral Associate

Department of Chemical Engineering, MIT  
Supervisor: Professor Paula T. Hammond

May 2006 - Present

- Demonstrated the *highest conductivity* ever obtained from a polyelectrolyte multilayer film.
- Developed a highly-conducting and methanol-resistant membrane from water-soluble polymers using the layer-by-layer assembly technique. Incorporated these membranes into a direct-methanol fuel cell; *improved the performance by over 50%*
- Currently investigating the use of polyphosphazene based polyelectrolytes in the assembly of solid-state electrolytes for batteries and dye-sensitized solar cells.
- Skilled in sulfonation of polymers, layer-by-layer assembly, impedance spectroscopy, and membrane-electrode assembly for Hydrogen and Methanol Fuel Cells.

### Post Doctoral Associate

Department of Materials Science & Engineering, University of Florida  
Supervisor: Professor Paul H. Holloway

January 2005 - April 2006

- Designed and fabricated a *dual functioning electroluminescent/electrochromic device*.
- Developed a technique to measure the hole-transport mobility of semiconducting polymers using the space charge limited current (SCLC) model.
- Developed AC driven light-emitting thin film devices based on lanthanide doped ZnS.
- Skilled in polymer light-emitting diodes, light-emitting electrochemical cells, high vacuum thin film deposition, and analysis of thin films by SIMS, SEM, AES, and EDS.

### Research Assistant

Department of Chemistry, University of Florida  
Advisor: Professor John R. Reynolds

2001 - 2004

- Studied non-lithographic patterning of display devices based on conjugated polymers.
- Developed line patterning to form color-matching electrodes for lateral display devices.
- Demonstrated *the first truly* all-organic electrochromic device.
- Developed a novel method to form back-side electrical contacts on porous substrates that increases the active electrode space and allows vertically integrated electronic devices.
- Skilled in prototype device engineering, conducting polymers, electrochemical characterization, electrochromic display devices, polymer LEDs, and electrode patterning

### Undergraduate Researcher

Department of Chemistry, Bilkent University, Ankara, Turkey.

1997 - 1999

- Studied the surface modification of polypropylene films. Skilled in contact angle measurements, X-Ray Photoelectron Spectroscopy (XPS), and Specular IR Spectroscopy of Dichroic Materials.

## AWARDS AND ACTIVITIES

<b>Finalist at the Ignite Clean Energy Competition</b> – Technical Team Lead	2009
<b>Recipient of the Council for the Arts Grants (\$800)</b> , MIT	2009
<b>Honorarium to Participate ICMAT 2007</b> NTU, Singapore	2007
<b>Stasch Award for Excellence in Scientific Publication</b> University of Florida	2004
<b>Graduate Student Representative</b> Department of Chemistry, University of Florida	2004
<b>Outstanding Academic Achievement</b> University of Florida ( <i>Eight chosen among 400 students</i> )	2003
<b>Fellowship for the Young Scientists</b> Turkish National Council for Science and Technology	1995 - 1999
<b>Member</b> ACS (2000 - Present), MRS (2001 - Present), AIChE (2008 - Present)	

## SELECTED PUBLICATIONS

- Argun, A. A.; Ashcraft, J. N.; Herring, M.; Lee, D. K. Y.; Allcock, H. R.; Hammond, P. T. “*Ion Conduction and Water Transport in Polyphosphazene Multilayers*” submitted to *Chemistry of Materials*, (2009)
- Jia, P.; Argun, A. A.; Xu, J.; Xiong, S.; Ma, J.; Hammond, P. T. Lu, X.; “*Layer-by-layer Assembled Films Containing Polyaniline-tethered Silsesquioxane Nanocube*” *Chemistry of Materials*, (2009), in press.
- Kim, B.-S.; Gao, H.; Argun, A. A.; Matyjaszewski, K.; Hammond, P.T. “*All Star Polymer Multilayers as pH-Responsive Nanofilms*” *Macromolecules*, (2009), 42(1), 368-375. ([DOI](#))
- Argun, A. A.; Ashcraft, J.N.; Hammond, P.T. Law “*Highly Conductive, Methanol Resistant Polyelectrolyte Multilayers*” *Advanced Materials*, (2008), 20(8), 1539-1543. ([DOI](#))
- DeVito, D. M; Argun, A. A.; Law, E.; Davidson, M. R.; Puga-Lambers, M.; Holloway, P. H. “*Effects of processing parameters on electroluminescence of RF magnetron sputter deposited ZnS:ErF<sub>3</sub>*” *Journal of Vacuum Science and Technology A*, (2007), 25(2), 225-231. ([DOI](#))
- Paul, G. K.; Mwaura J. K.; Argun, A. A.; Taraneekar, P.; Reynolds, J. R. “*Cross-Linked Hyperbranched Arylamine Polymers as Hole-Transporting Materials for Polymer LEDs*” *Macromolecules* (2006), 39,7789 ([DOI](#))
- Argun, A. A.; Reynolds, J. R. “*Line Patterning for Flexible and Laterally Configured Electrochromic Devices*” *Journal of Materials Chemistry* (2005), 15(18), 1793 - 1800. ([DOI](#))
- Argun, A. A.; Berard, M.; Aubert, P.-H.; Reynolds, J.R. “*Back-Side Electrical Contacts for Patterned Electrochromic Devices on Porous Substrates*” *Advanced Materials* (2005), 17(4), 422-426. ([DOI](#))
- Argun, A. A.; Aubert, P.-H.; Thompson, B.C.; Schwendeman, I.; Gaupp, C.L.; Hwang, J.; Pinto, N.J.; Tanner, D.B.; MacDiarmid, A.G.; Reynolds, J.R. “*Multi-Colored Electrochromism In Polymers: Structures And Devices*” *Chemistry of Materials* (2004), 16(23), 4401-4412 ([DOI](#))
- Aubert, P.-H.; Argun, A. A.; Cirpan, A.; Tanner, D. B.; Reynolds, J.R. “*Microporous Patterned Electrodes for Color Matched Electrochromic Polymer Displays*” *Chemistry of Materials* (2004), 16(12), 2386-2393. ([DOI](#))
- Argun, A. A.; Cirpan A.; Reynolds J.R. “*The First Truly All-Polymer Electrochromic Devices*” *Advanced Materials*, (2003), 15(16), 1338-1341. ([DOI](#))

## PATENTS

- Hammond, P.T.; Argun, A. A.; Ashcraft, J.N. “*Highly Conducting Solid State Ionics for Electrochemical Systems and Methods of Fabricating Them Using Layer-By-Layer Technology*” US patent application 61/025,096, 2009.
- Reynolds, J.R.; Argun, A. A.; Berard, M.; Aubert, P.-H. “*Device for Contacting Patterned Electrodes on Porous Substrates*” US 7,333,257, 2004. ([html](#))
- Reynolds, J.R.; Zong K.; Schwendeman I; Sonmez G.; Schottland P.; Argun A. A.; Aubert P.-H. “*Electrochromic Polymers and Polymer Electrochromic Devices*” US 6,791,738, 2003. ([html](#))

## FEATURES

- “*Fuel Cell Power Up*” Technology Review, November/December 2008, pp 92. ([html](#))
- “*In Search of Forever*” The Economist, 6/14/2008, pp 97. ([html](#))

## SELECTED PRESENTATIONS

- *AIChE Annual Meeting*. Nashville, TN November 2009  
Oral Presentation “**Layer-by-Layer Assembly to Design Novel Membrane Architectures**”
- *AIChE Annual Meeting*. Philadelphia, PA November 2008  
Oral Presentation “**Polyelectrolyte Multilayers for Direct-Methanol Fuel Cells**”
- *236<sup>th</sup> American Chemical Society National Meeting*. Philadelphia, PA August 2008  
Oral Presentation “**Functional Thin Film Nanoassemblies for Electrochemical Energy Conversion Devices**”
- *International Conference on Materials for Advanced Technologies (ICMAT)*, Singapore July 2007  
Keynote Presentation “**Layer-by-Layer Assembly of Functional Thin Films for Electrochemical Devices**”
- *Materials Research Society Spring Meeting*. San Francisco, CA March 2005  
Oral Presentation: “**Infrared Electroluminescence from Zinc Sulfide Doped with Rare Earth Fluorides**”
- *5<sup>th</sup> International Meeting on Electrochromism (IME-5)*. Denver, CO August 2002  
Oral Presentation: “**Electrochromic Devices Based on Dual Conducting Polymers**”