

# Brian Michael Cromer

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## **OBJECTIVE**

A position at a company developing polymeric products through interdisciplinary science, requiring strong technical, communication, and leadership skills in a collaborative setting

## **HIGHLIGHTS**

- Expertise in synthesis and process-structure-property relationships of polyolefin homopolymers, blends, and composites
- Interdisciplinary background combining polymer chemistry, physics, and engineering
- Designed processing methods for new semicrystalline polymer morphologies with improved physical properties

## **PROFESSIONAL TRAININGS AND SKILLS**

Organic synthesis

Polymer processing: extrusion, molding

Mechanical testing, failure analysis

Applied rheology

Thermal analysis: TGA, DSC, DMA, TMA

Pyrolysis combustion flow calorimetry (PCFC)

Gel permeation chromatography (GPC)

X-ray scattering: WAXS, SAXS

Microscopy: AFM, OM, SEM, TEM

Spectroscopy: FT-IR, UV-Vis, XPS, NMR

## **EDUCATION**

**University of Massachusetts Amherst-Amherst, MA**

Polymer Science and Engineering MS & PhD Program, GPA: 3.7/4.0

2010-Present

**Case Western Reserve University-Cleveland, OH**

BSE Polymer Science and Engineering, GPA: 3.9/4.0, *summa cum laude*

2010

## **SELECTED HONORS AND AWARDS**

- National Defense Science and Engineering Graduate Research Fellowship (NDSEG) 2012
- NASA Space Technology Graduate Research Fellowship (declined to accept NDSEG) 2012
- ESPN The Magazine First Team Academic All-District (CWRU Track & Field) 2010
- Provost's Scholarship (CWRU) 2006-2010

## **RESEARCH**

**Polymer Science and Engineering, University of Massachusetts Amherst**

2010-Present

Advisors: Professors E.B. Coughlin and A.J. Lesser

- Synthesized and characterized polyolefin-nanocomposites for low cost, lightweight automotive materials
  - Developed an *in-situ* synthesis method to homogeneously polymerize polypropylene within nanographite dispersions, using a chiral *ansa*-metallocene catalyst system. Engineered reaction conditions to mitigate catalyst poisoning from nanoparticle surface chemistry
  - Related thermal, morphological, and physical characteristics of synthesized material to mechanical performance
  - Collaborated with an international team of American automotive engineers, as well as chemists from the University of Hamburg to define project goals, develop synthesis strategies, and achieve material performance requirements
- Designed a new processing technique called Melt-mastication for fabrication of polymer nanocomposites with improved nanoparticle dispersion
  - Enhanced dispersion of several polymer nanocomposite systems using conventional melt processing equipment, resulting in improved mechanical and electrical properties
  - Explained improved dispersion quality through a modified shear-lag model. Correlated property improvements to changes in dispersion quality and semi-crystalline morphology

- Developed a dynamic annealing technique to generate novel crystal morphology in semicrystalline polymers
  - Characterized thermal, mechanical, and physical property improvements from novel crystal morphology
  - Currently writing provisional patent application

## **Biomedical Engineering, Case Western Reserve University (CWRU)**

2008-2010

Advisor: Professor R.E. Marchant

- Synthesized and characterized surfactant polymers for coronary artery prostheses
  - Designed polymer interfaces to mimic the physical and chemical characteristics of tissue interfaces
  - Synthesized and characterized non-thrombogenic materials from poly(vinyl amine)-based copolymers, poly(ethylene oxide) based hydrogels, and peptide-surfactant polymers to create biomimetic interfaces

## **PUBLICATIONS**

- Cromer, B.M., Coughlin, E.B., Lesser, A.J., “Melt-Mastication for Improved Polyolefin Nanocomposite Dispersions,” *Composites Science and Technology*, in review 2014
- Cromer, B.M., Coughlin, E.B., Lesser, A.J., “*In-situ* Synthesis Method for Graphene-Polypropylene Nanocomposites: Improved Thermal and Physical Properties,” in preparation 2014

## **CONFERENCE PROCEEDINGS & PRESENTATIONS**

- Cromer, B.M., Coughlin, E.B., Lesser, A.J., “Melt-Mastication for Polyolefin Nanocomposite Dispersions,” Society of Plastics Engineers, Automotive Composites Conference and Exhibition (ACCE), 2013
- Cromer, B.M., Lesser, A.J., Coughlin, E.B., “*In-situ* Polymerization of Graphene-Isotactic Polypropylene Nanocomposites,” Society of Plastics Engineers, Annual Technical Conference (ANTEC), 2013
- Cromer, B.M., Coughlin, E.B., Lesser, A.J., “*In-situ* Synthesis Method for Graphene-Polypropylene Nanocomposites: Improved Thermal and Physical Properties,” Center for UMass Industry Research on Polymers Symposium, 2011
- Cromer, B.M., Zhu, J., Marchant, R.E., “Comb-Like Saccharide Amphiphiles as Biomimetic Interface Materials,” Polymer Initiative of Northeast Ohio Conference (PINO), 2008

## **PROFESSIONAL MEMBERSHIPS**

- American Chemical Society 2010-Present
- Society of Plastics Engineers 2010-Present

## **ACTIVITIES**

- **Educational Outreach Coordinator-University of Massachusetts Amherst** 2010-Present  
Organized the ASPIRE program, a hands-on laboratory experience to introduce materials science to high school students. Directed graduate student volunteers, designed engaging laboratory activities, and mentored high school students
- **Instrument Manager-University of Massachusetts Amherst** 2010-Present  
Responsible for maintaining the following instruments, as well as training scientists to use them:  
DMA (TA Instruments, Q800), TGA (TA Instruments, Q500), DSC (TA Instruments, Q200),  
High Temperature GPC (Polymer Laboratories, PL-GPC 220), Rheometer (TA Instruments, AR2000),  
Controlled Atmosphere Glovebox (MBRAUN, Labmaster 100)