### Stephen P. McCarthy

### Emeritus Professor University of Massachusetts Lowell Departments of Biomedical Engineering and Plastics Engineering Lowell, Massachusetts 01854

### EDUCATION AND ACADEMIC QUALIFICATIONS

B.S.	Southeastern Massachusetts University,	Textile Chemistry,	1978
M.S.E.	Princeton University,	Chemical Engineering,	1980
PhD	Case Western Reserve University,	Macromolecular Science,	1984

Worcester Polytechnic Institute, Medical Device Management Certificate, 2005

### ACADEMIC EXPERIENCE

- University of Massachusetts Lowell, Assistant Professor, 1984-1988 Department of Plastics Engineering
- University of Massachusetts Lowell, Associate Professor, 1988-1991 Department of Plastics Engineering
- University of Massachusetts Lowell, Professor, 1991-present Department of Plastics Engineering
- University of Massachusetts Lowell, Director, 2016-2019 Biomedical Engineering and Biotechnology Program
- University of Massachusetts Lowell, Chair, 2018 Department of Biomedical Engineering

### PATENTS ISSUED

- "Micro and Nanospheres Based on Natural Materials", Pending, with Balint Koroskenyi and Robert Nicolosi
- "Novel Biodegradable Bone Plates and Bonding Systems", with Jeffrey Weinzweig, USA Patent No. US2008/0234754 A1, Effective from September 25, 2008.
- "Polysaccharide-Containing Block Copolymer Particles and Uses Thereof", with Balint Koroskenyi and Robert Nicolosi, Pending, USA Patent Application 20110020227.
- "Polysaccharide-Containing Block Copolymer Particles and Uses Thereof", with Balint Koroskenyi and Robert Nicolosi, USA Patent Application 7,763,663.

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- "Surface Finishing Compression Molding with Multi-Layer Extrusion", with Arthur Delusky, Robert Lucke, Thomas Ellison and Qing Guan, USA Patent No. 6,770,230.
- "Surface Finishing Compression Molding with Multi-Layer Extrusion", with Arthur Delusky, Robert Lucke, Thomas Ellison and Qing Guan, USA Patent No. 6,964,802.
- "Molded Article and Process for Preparing Same", with Thomas M. Ellison, Arthur Delusky and Qing Guan, USA Patent No. 6,670,028.
- "Process and Apparatus for Preparing a Molded Article", with Thomas Ellison, and Arthur Delusky, USA Patent No. 6,506,334.
- "Molded Article", with Thomas M. Ellison, Arthur K. Delusky, Robert Lucke, USA patent No. 6,440,593.
- "Refined Vegetable Oils and Extracts Thereof", with Carl Lawton, Robert Nicolosi, USA Patent No. 6,197,357 B1.
- "Bioresorbable Copolymers", with Richard A. Gross, Xianhai Chen, USA Patent No. 6,093,792.
- "Polylactic Acid-Based Blends", with, Richard Gross, and Wenguang Ma, USA Patent No. 5,883,199.
- "Composition of and Method for Forming High Molecular Weight Predominately Syndiotactic Substituted-Poly (β-Propioesters)", with Richard Gross and John Kemnitzer, USA Patent No. 5,440,007.
- "Biodegradable and Hydrogradable Diblock Copolymers Composed of Poly (β-Hydroxyalkanoates and Poly (Lactones) or Poly (Lactide) Chain Segments", with Richard Gross and Michael Reeve, USA patent No. 5,439,985.
- "Gamma-Poly(Glutamic Acid) Esters", with Richard Gross and Devang Shah, USA Patent No. 5,378,807.

### PUBLICATIONS RELATED TO INJECTION MOLDING

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- A study on recycling of polyhydroxybutyrate (PHB) copolymer and its effect on material properties, Annual Technical Conference Society of Plastics Engineers, Bhavin Shah, Robert Whitehouse and Stephen McCarthy vol. 70, (2012) pg 260-264.
- "Processing and Blends of Biopolymers", 66th Annual Technical Conference Society of Plastics Engineers, (2008)
- "Improving the toughness of poly(lactic acid)(PLA) through co-continuous, immiscible, biodegradable blends with PHA". With Jinkoo Lee, Annual Technical Conference -Society of Plastics Engineers (2007), 65th 1569-1572.
- "The Effect of Nanoclays on the Properties of PLLA-modified Polymers: Part I: Mechanical and Thermal Properties", D. Lewitus, A. Ophir, S. Kenig and S. McCarthy, J. Polymers and the Environment, Vol 14, no. 1, pp. 171-177, (2006).
- "Mechanical Testing and Characterization of Biopolymers", Society of Plastics Engineers Annual Technical Conference, (Vol. 64), (2006).
- "Electrically Conductive Nano-composites in Powdered Injection Molding", with Ankur Maheshwari, Society of Plastics Engineers Annual Technical Conference, (2003), (61st) (Vol. 61), pp. 616-619.
- "Process Dynamics in Sequential Valve Gate Injection Molding-Processing Strategy and Process Control", Shin, Suk-young; Schott, Nick; McCarthy, Stephen., Society of Plastics Engineers Annual Technical Conference (2001), 59th(Vol. 1), 694-698.

- "Large, Structural, "Class A" Thermoplastic Automotive Part Production Without Painting", McCarthy, Stephen; Guan, Qing; McCarthy, Shawn; Shetty, Malar Rohith; Ellison, Thomas, Annual Technical Conference - Soc. Plast. Eng. (2001), 59th(Vol. 3), 2448-2452.
- "Biodegradable Polymer Blends for Medical Applications", with P. Canale, S. Mehta, Journal of Applied Medical Polymers, Volume 5, No. 2, Pgs. 65-71, (Autumn 2001)
- "Cavity Pressure Transfer Extends Prototype Tool Life", with John Dell'Arciprete and Robert Malloy, Modern Plastics, Edited by William A. Kaplan, pgs. 125-128, (January 2000).
- ""Kinetic" Welding of Plastic Parts", with Judith A.H. Jones, Yogish Mahadevaiah, Balint Koroskenyi, and Sanjay Mehta, 58th Society of Plastics Engineers Annual Technical Conference Proceedings, Volume 46, Number 1, pp. 1232-1236, May 2000.
- "Thermoplastic Paint (A.k.a. Film Finish, Paint Film, Dry Paint) A Complementary Technology for Exterior Automotive Plastic", with Thomas Ellison, 58th Society of Plastics Engineers Annual Technical Conference Proceedings, Volume 46, Number 1, pp. 2607-2610, May 2000.
- ""Class A" Thermoplastic Automotive Part Production without Painting", with Qing Guan, Chetan Makadia and Thomas Ellison, 58th Society of Plastics Engineers Annual Technical Conference Proceedings, Volume 46, Number 3, pp. 2654-2657, May 2000.
- "Analysis of Adhesive Properties of Different Engineering Thermoplastics To Elastomers By a Two-Shot Injection Molding Process", Sandip Patel, Chetan Makadia, Qing Guan and Sanjay Mehta, 58th Society of Plastics Engineers Annual Technical Conference Proceedings, Volume 46, Number 3, pp. 2658-2662, May 2000.
- "Cavity Pressure Studies for Stereolithography Produced Tooling", with John Dell'Arciprete and Robert Malloy, 58th Society of Plastics Engineers Annual Technical Conference Proceedings, Volume 45, Number 1, pp. 467-471, May 1999.
- "Rapid Tooling: A Study of Different Cooling Techniques for Mold Inserts Used in the Direct AIM (ACES Injection Molding) Process", with Sandeep Saurkar, and Robert Malloy, 58th Society of Plastics Engineers Annual Technical Conference Proceedings, Volume 45, Number 1, pp. 1105-1108, May 1999.
- "A New Approach for In-Mold Finishing: The Valyi Surface Finishing/Compression Molding Process", with Qing Guan, Sandip Patel, and Thomas Ellison, 58th Society of Plastics Engineers Annual Technical Conference Proceedings, Volume 45, Number 1, pp. 2911-2914, May 1999.
- "The Influence of Injection Molding Conditions on Biodegradable Polymers", with M. Parikh and R. Gross, Journal of Injection Molding Technology, Vol. 2, No. 1, pp. 30-36, March (1998)
- "Effect of Fiber Orientation on the Mechanical Properties of an Injection Molded Part and a Stereolithography-Insert Molded Part", with M. Damle, S. Mehta, R. Malloy, Society of Plastics Engineers Annual Technical Conference, Volume 44, pgs. 584-588 (May 1998).
- "Analysis of Metal Coating Effects on Stereolithography Tooling for Injection Molding", with David T. Burns and Robert Malloy Society of Plastics Engineers Annual Technical Conference, Volume 44, pgs. 888-892, (May 1998).
- "Reactive compatibilization of Biodegradable Blends of Poly(lactic acid) and Poly(ccaprolactone), L. Wang, W. Ma, R.A. Gross & S.P. McCarthy, Polymer Degradation and Stability, 59, pg 161-168, (1997).
- "Pultrusion of Composites", Advanced Composites Manufacturing, Ed. Timothy G. Gutowski, John Wiley & Sons, Inc., New York, (with J. Fanucci and S. Nolet), pgs.259-295, (1997).

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- "Rapid Stereolithography Tooling for Injection Molding: The Effect of Cooling Channel Geometry", (with M. Janczyk and R. McLaughlin), J.Injection Molding Technology, Vol. 1, No. 1 (1997).
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- "Self-Reinforcement of Polypropylene by Oscillating Packing Injection Molding Under Low Pressure". (with Q. Guan, X. Zhu, D. Chu, K. Shen, F.S. Lai), J.Appl.Polm. Sci., 62, Pgs. 755-762, (1996).
- "Fiber Reinforced Nylon-6 Composites Produced by the Reaction Injection Pultrusion Process". (with B.G. Cho, J. Fanucci, S. Nolet), Polymer Composites, 17(5), pgs. 673-681, October (1996)
- "Polymers in Biodegradable Surgical Devices: Blending Poly(Glycolic-Acid) with Other Biodegradable Plastics", (with G. Rocha), Medical Plastics and Biomaterials, May/June 1996, Pgs. 44-48.
- "Effects of Crystallinity and Orientation on the Enzymatic Degradation of Poly(Lactic Acid)", Soc. of Plastics Eng., Technical Papers, Vol. 40, (1995), (with Hua Cai, Vipul Dave, Richard A. Gross).
- "Liquid Crystalline Behavior of Konjac Glucomann in Aqueous Solutions", Polym. Preprints, Am. Chem. Soc., Div. Polym. Sci., Vol. 35(2), pgs 448-449, (1994). (with Vipul Dave, Jo Ann Ratto, Deeleep Rout, Richard A. Gross, David L. Kaplan)
- "Behavior of Fiber Reinforcements During Composite Processing", Journal of Polymer Composites, (1991) (with Y. Kim).
- "Verification Mold for Flow, Cooling, Shrinkage, and Warpage", Technical Papers, SPE, 36, 283 (1990). (with W. Discipio.).
- "Study of Pressure, Volume, and Temperature (PVT) Relations and High Temperature Thermal Analysis (DTA)", Polymer Preprints, 31,1,561 (1990) (with S.M. Bhatt.)
- "The Effect of Polypropylene Nucleants on the Rates of Crystallization of Poly (Ethylene Terephthalate)", Soc. of Plastics Eng., Technical Papers, 36, 1008 (1990) (with X. Chen.).
- "Mold Optimization Using Rule-Based Software", Soc. of Plastics Eng., Technical Papers, 36, 1107 (1990). (with D. Cinquegrana.).
- "The Effect of Crystallization Conditions on the Multiple Melting Peaks of Melt-Crystallized PET", Soc. of Plastics Eng., Technical Papers, 36, 1000 (1990). (with S.H. Leu)
- "Computer Flow Analysis Verification of Phenolics", Technical Papers, SPE, 36, 688 (1990). (with P.A. O'Brien, J. P. Beaumont.)
- "Effect of Glass Fiber Orientation on the Thermal Diffusitivity and Thermal Conductivity of Polymer Melts", Technical Papers, SPE, 36, 565 (1990) (with K. Shah, S. Orroth.)
- "Rheological and Mechanical Properties of Immiscible Blends of EVOH and Styrene-Based Polymers", Technical Papers, SPE, 35, 1824, (1989). (with O. Chang, and N.R. Schott)
- "Compressibility and Relaxation of Fiber Reinforcements During Composite Processing" Soc. of Plastics Eng., Technical Papers, 36, 1252 (1990). (with Y.R. Kim, J.P. Fanucci,)
- "Verification of Material Characterization for Filling Simulation Software Packages", SPE RETEC, L-1, (with S.A. Orroth, and R. Clarke,) (1988).

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### **SEMINARS**

	"Mechanical, Physical, and Rheological Properties of Polymers" Plastics Engineering Industrial		
	Seminars, University of Lowell, 1985-present		
	Industrial Seminar at Clariant Corp. on June 2005		
	Industrial Seminar at Hewlett-Packard Company, Renovol, Israel, 2005		
	Industrial Seminar at Exxon Company, Texas, 1999		
	Massachusetts Lowell 1008		
	"Biodegradable Polymers and Blends" Plastics Engineering Industrial Seminars University of		
	Lowell 1985		
	"Computer Aided Injection Molding". Plastics Engineering Industrial Seminars, University of		
	Lowell 1985		
	Industrial Seminar at 3M Company, Minneapolis, May 1992		
	RESEARCH CONTRACT AND GRANT SUPPORT		
	National Institutes of Health- POCTRN-CAPCaT, \$7,900,000		
	BARDA – DRIVe, \$500,000		
	Avaya, (Kinetic Welding) (Intellectual property donation), \$23,000,000		
	Solutia, (Nylon Pultrusion) (Intellectual property donation), \$5,779,500		
	Commonwealth of Massachusetts, "Massachusetts Medical Device Development Center", \$4,000,000		
	Valyi (CSBM) (licenses of Intellectual property donation), \$3,000,000		
	Metabolix, "Development of Novel of Biodegradable Materials, \$1,500,196		
	NSF Center for Biodegradable Polymer Research, \$1,200,000 Industrial Members (8/93-		
	present), Principal Investigator		
	David Pernick UMass Lowell/Shenkar College Exchange Agreement, \$ 1,000,000		
	Valtek, LLC, "Class A" Thermoplastic Automotive Finish without Painting, \$625,000		
	Massachusetts Technology Collaborative John Adams Innovation Institute, "Massachusetts		
	Nedical Device Development Center <sup>*</sup> , 5500,000 Delumer Degradation Research Center <sup>*</sup> , 575,000, Industrial Members (8/80, 8/02)		
	Digital "Plastics Materials Research" \$458.706		
	US Army Natick "Advanced Materials from Renewable Resources" \$365,596		
	US Environmental Protection Agency \$300,004 (1998-2000) Principal Investigator		
	Institute for Plastics Innovation, Co-Director, \$300,000, Industrial Members, (1995-present)		
	Lucent Technologies. Kinetic Weld, \$165,000		
	Tycom, Undersea Photonic Connector, \$161,000		
	Metabolix Inc., Performance of PHA Derived Chemicals and Polyols in Polyurethane, \$141,465		
	Duracell Company, Polymeric Batteries, \$140,000		
	3M, "Composting Research", \$155,000		
	Massachusetts Technology Collaborative John Adams Innovation Institute, "Massachusetts Medical Device Development Center", \$150,000		
	UMass Presidents Office Seed Funding "Massachusetts Medical Device Development Center", \$135,000		
	Monsanto Company "Mold Analysis Research" \$123,000		
	Warner Lambert "Biodegradable Polymer Research" \$116.501		
	National Science Foundation, "Biodegradable Polymer Research Center", \$110,000 (8/93-8/95)		
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