Curriculum Vitae

Andrew J. Gravelle, M.Sc.

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Education

Master of Science, Biophysics — **2008 – 2010**
University of Guelph, Guelph, ON

Honors Bachelor of Science, Biophysics — **2003 – 2008**
University of Guelph, Guelph, ON

Graduate Teaching Assistantships

Introductory Physics — **Fall of 2008 – 2010**
University of Guelph, Guelph, ON

Biophysics of Excitable Cells — **Winter of 2008, 2009**
University of Guelph, Guelph, ON

Academic Awards

College of Physical and Engineering Dean's Scholarship – *$4,000* — **2009**
University of Guelph, Guelph, ON

College of Physical and Engineering Dean's Scholarship – *$1,000* — **2008**
University of Guelph, Guelph, ON

Ontario Graduate Scholarship - *$15,000*
University of Guelph, Guelph, ON — **2008**

Professional Societies

American Oil Chemists' Society — **2012 – Present**

Significant Academic Contributions

Refereed Publications

Gravelle, A.J., Barbut, S., & Marangoni, A.G. Food-grade filler particles as an alternative method to modify the texture and stability of myofibrillar protein gels. (2017) *Scientific Reports*, 7, 11544(1-16).

Gravelle, A.J., Marangoni, A. G., & Barbut, S. The influence of particle size and protein content in particle-filled myofibrillar protein gels. (2017) *Meat and Muscle Biology*. 1, 109-121.

Gravelle, A.J., Blach, C., Weiss, J., Barbut, S., & Marangoni, A.G. Structure and properties of an ethylcellulose and stearyl alcohol:stearic acid (EC/SO:SA) hybrid oleogelator system. (2017) *European Journal of Lipid Science and Technology*. 119, 1700069(1-11).

Gravelle, A.J., Marangoni, A.G., & Barbut, S. Filled myofibrillar protein gels: Improving cooking loss and texture with model filler particles. (2017) *Food Structure*, 12, 73-81.

Gravelle, A.J., Davidovich-Pinhas, M., Barbut, S., & Marangoni, A.G. Influencing the crystallization behavior of binary mixtures of stearyl alcohol and stearic acid (SOSA) using ethylcellulose. (2017) *Food Research International,* 91, 1-10.

Blach, C., Gravelle, A.J., Peyronel, F., Weiss, J., Barbut, S., & Marangoni, A.G. Revisiting the crystallization behavior of stearyl alcohol : stearic acid (SO:SA) mixtures in edible oil. (2016) *RSC Advances,* 6, 81151-81163.

Gravelle, A.J., Marangoni, A.G., & Barbut, S. Insight into the mechanism of myofibrillar protein gel stability: Influencing texture and microstructure using a model hydrophilic filler. (2016) *Food Hydrocolloids,* 60, 415-425.

Wang, F.C., Gravelle, A.J., Blake, A.I., & Marangoni, A.G. Novel trans fat replacement strategies. (2016) *Current Opinion in Food Science,* 7, 27-34.

Gravelle, A.J., Davidovich-Pinhas, M., Zetzl, A.K., Barbut, S., & Marangoni, A.G. Influence of solvent quality on the mechanical strength of ethylcellulose oleogels. (2016) *Carbohydrate Polymers,* 135, 169-179.

Gravelle, A.J., Marangoni, A.G., & Barbut, S. Influence of particle size and interfacial interactions on the physical and mechanical properties of particle-filled myofibrillar protein gels. (2016) *RSC Advances,* 5, 60723-60735.

Davidovich-Pinhas, M., Gravelle, A.J., Barbut, S., & Marangoni, A.G. Temperature effects on the gelation of ethylcellulose oleogels. (2015) *Food Hydrocolloids,* 46, 76-83.

Zetzl, A.K., Gravelle, A.J., Kurylowicz, M., Dutcher, J., Barbut, S., & Marangoni A.G. Microstructure of ethylcellulose oleogels and its relationship to mechanical properties. (2014) *Food Structure,* 2 (1-2), 27-40.

Gravelle, A.J., Barbut, S., Quinton, M., & Marangoni, A.G. Towards the development of a predictive model of the formulation-dependent mechanical behaviour of edible oil –based ethylcellulose oleogels. (2014) *Journal of Food Engineering,* 143, 114-122.

Gravelle, A.J., Barbut, S., & & Marangoni, A.G. Fractionation of ethylcellulose oleogels during setting. (2013) *Food & Function*, 4 (1), 153–161.

Gravelle, A.J., Barbut, S., & Marangoni, A.G. Ethylcellulose oleogels: Manufacturing considerations and effects of oil oxidation. (2012) *Food Research International*, 48 (2), 578–583.

Janik, R., Ritz, E., Gravelle, A., Shi, L., Peng, X., & Ladizhansky, V. Interresidue carbonyl-carbonyl polarization transfer experiments in uniformly ^{13}C,^{15}N-labeled peptides and proteins. (2010) *Journal of Magnetic Resonance,* 203 (1), 177–184.

Conference Presentations (Oral)

Gravelle, A.J., Blach, C., Weiss, J., Barbut, S., & Marangoni, A.G. Ethylcellulose and stearyl alcohol : stearic acid (EC/SO:SA) mixed oleogels: Characterizing the influence of EC as a function of SO:SA ratio. 108th Annual Meeting of the American Oil Chemists' Society. Orlando, Florida, USA, April 30–May 3, 2017.

Gravelle, A.J., Nicholson, R., & Marangoni, A.G. Influencing the macro- and microstructural properties of food gels using a model hydrophilic filler. 13th International Symposium On the Properties of Water. Lausanne, Switzerland, June 26–29, 2016.

Gravelle, A.J., Marangoni, A.G., & Barbut, S. Insights into the mechanism of myofibrillar protein gel stability: Influence of size and volume fraction of a model hydrophilic filler on texture and microstructure. 13th International Hydrocolloids Conference: Natural Emulsifiers and Hydrocolloids – Keys for Functionality and Human Health. Guelph, Ontario, Canada, May 16–20, 2016.

Wang, F.C., Gravelle, A.J., Nicholson, R., O'Sullivan, C., Peyronel, F., & Marangoni, A.G. Perspectives on oil structuring. 107th Annual Meeting of the American Oil Chemists' Society. Salt Lake City, Utah, USA, May 1–4, 2016.

Blach, C., Gravelle, A.J., Peyronel, F., Weiss, J., Barbut, S., & Marangoni, A.G. Revisiting mixtures of stearyl alcohol/stearic acid as an oleogelator system. 107th Annual Meeting of the American Oil Chemists' Society. Salt Lake City, Utah, USA, May 1–4, 2016.

Gravelle, A.J., Davidovich-Pinhas, M., Barbut, S., & Marangoni, A.G. Influencing the crystallization behavior of binary mixtures of stearyl alcohol and stearic acid using ethylcellulose. 107th Annual Meeting of the American Oil Chemists' Society. Salt Lake City, Utah, USA, May 1–4, 2016.

Davidovich-Pinhas, M., Gravelle, A.J., Barbut, S., & Marangoni, A.G. Hybrid oleogel made of polymer and crystalline gelators. 16th Food Colloids Conference, Wageningen, Netherlands, April 10–13, 2016.

Gravelle, A.J., & Marangoni, A.G. Oleogelation as a new strategy to functionalize high liquid content fats. PIPOC 2015: Malaysian Palm Oil Board International Palm Oil Congress. Kuala Lumpur, Malaysia, October 6–8, 2015.

Davidovich-Pinhas, M., Gravelle, A.J., Barbut, S., & Marangoni, A.G. New insight into the gelation mechanism of ethylcellulose/canola oil oleogels. Delivery of Functionality in Complex Food Systems: Physically-Inspired Approaches from the Nanoscale to the Microscale. Paris, France, July 14–17, 2015.

Gravelle, A.J., Davidovich-Pinhas, M., Nicholson, R., Barbut, S., & Marangoni, A.G. New strategies for tailoring the mechanical properties of ethylcellulose oleogels for food applications. 7th International Symposium on Food Structure and Rheology. ETH, Zurich, Switzerland, June 7–11, 2015.

Gravelle, A.J., Davidovich-Pinhas, M., Barbut, S., & Marangoni, A.G. New approaches for the enhancement of ethylcellulose oleogels for fat replacement. 106th Annual Meeting of the American Oil Chemists' Society. Orlando, FL, U.S.A., May 3–6, 2015.

Gravelle, A.J., Barbut, S., & Marangoni, A.G. Towards elucidating the role of lipid-protein interactions on the textural properties of comminuted meat products. 105th Annual Meeting of the American Oil Chemists' Society. San Antonio, TX, U.S.A., May 4–7, 2014.

Gravelle, A.J., Barbut, S., & Marangoni, A.G. Formation of vegetable oil-based ethylcellulose oleogels at the macro- and micro-scale. 104th Annual Meeting of the American Oil Chemists' Society. Montréal, QC, Canada, April 28–May 1, 2013.

Gravelle, A.J., Quinton, M., Barbut, S., & Marangoni, A.G. Engineering ethylcellulose oleogel mechanical properties through compositional modifications. 245th National Meeting of the American Chemical Society. New Orleans, U.S.A., April 7–11, 2013.

Gravelle, A.J., Barbut, S., & Marangoni, A.G. Development of a response surface to tailor the mechanical properties of edible oil organogels for a diverse range of applications in food systems. 103rd Annual Meeting of the American Oil Chemists' Society. Long Beach, CA, U.S.A., April 29 –May 2, 2012.

Gravelle, A.J., Barbut, S., & Marangoni, A.G. Effects of oxidation on the physical and mechanical properties of ethylcellulose oleogels. 6th International Symposium on Food Structure and Rheology. ETH, Zurich, Switzerland, April 10–13, 2012.

Conference Presentations (Poster)

Barbut, S., Gravelle, A.J., Marangoni, A.G. Edible crystalline particles as model fillers in comminuted meat products. 63rd International Congress of Meat Science and Technology, Cork, Ireland, August 13–18, 2017.

Gravelle, A.J., Barbut, S., Marangoni, A.G. Particle-filled composite food gels: Investigating the use of hydrophilic filler particles to improve the stability and large deformation properties of myofibrillar protein gels. 7th Nano Ontario Conference, Guelph, ON, Canada, November 10–11, 2016.

Gravelle, A.J., Barbut, S., Marangoni, A.G. Insight into the mechanism of myofibrillar protein gel stability: Influencing texture and microstructure using a model hydrophilic filler. 16th Food Colloids Conference, Wageningen, Netherlands, April 10–13, 2016.

Barbut, S., Gravelle, A.J., Marangoni, A.G. Composite gels: Effects of inert particles on the texture of comminuted meat batters. 61st International Congress of Meat Science & Technology. Clermont-Ferrand, France, August 23–28, 2015.

Gravelle, A.J., Marangoni, A.G., Barbut, S. Particle filled myofibrillar protein gels: Investigating the role of particle size and protein/filler interactions. 7th International Symposium on Food Structure and Rheology. Zurich, Switzerland, June 7–11, 2015.

Gravelle, A.J., Barbut, S., Marangoni, A.G. Effects of oxidation on the mechanical properties of canola oil-based ethylcellulose oleogels. 103rd Annual Meeting of the American Oil Chemists' Society. Long Beach, CA, U.S.A., April 29–May 2, 2012.

Gravelle, A.J., Barbut, S., Marangoni, A.G. Characterization of the mechanical properties of edible oil organogels for applications in food systems. 4th International Symposium on the Delivery of Functionality in Complex Food Systems. Guelph, ON, Canada, August 21–24 2011.

Gravelle, A.J., Peng, X., Ladizhansky, V. Characterization of Rotameric Motions in Microcrystalline Proteins Using Rotational Resonance Solid State NMR Spectroscopy. Guelph-Waterloo Physics Institute Annual Graduate Poster Session. Guelph, ON, Canada, July 2010.

Gravelle, A.J., Peng, X., Ladizhansky, V. Characterization of Rotameric Motions in Amino Acid Side Chains Using Rotational Resonance Solid State NMR Spectroscopy. Guelph-Waterloo Physics Institute Annual Graduate Poster Session. Guelph, ON, Canada, July 2009.

Significant Research Experience

Research Associate under Dr. Alejandro Marangoni **Feb. 2011 – Present**
Department of Food Science, *University of Guelph*

- Practical experience with a variety of research techniques/equipment, such as light microscopy, scanning electron microscopy, DSC, rheology, NMR (low- and high-resolution), texture profile analysis, and x-ray diffraction
- Heavily involved in the planning and execution of laboratory experiments, data analysis, and writing/publishing peer-reviewed journal articles
- Propose and execute experiments based on previous findings and research targets
- Regularly attend and present research findings at international academic conferences
- Train new personnel on lab equipment, annually responsible for supervising temporary research staff

- Lead researcher on the characterization of ethylcellulose (EC) as an edible oil gelator
- Responsible for characterizing the mechanical/physical properties of gelled vegetable oils for use as fat substitutes in a variety of food systems
- Identified several techniques to modify the mechanical/textural properties of EC oleogels to modify mechanical/textural properties to improve functionality
- Identified and characterized a novel hybrid oleogel system with unique functional properties
- Involved in the implementation of gelled oils as a substitute for animal fat in comminuted meat products

- Primary researcher on project investigating the influence of model filler particles on the physical and mechanical characteristics of particle-filled food gels
- Lead research investigating the role of fat as a particulate filler in comminuted meat products
- Performed research utilizing food-grade filler particles as stabilizing agents in processed cheese products
- Investigating the influence of filler properties (size, surface chemistry, etc.) on the stability, and mechanical/textural properties of model comminuted meat systems
- Investigating the applicability of existing particle-reinforcement theories to food systems containing a discrete particulate phase (e.g. comminuted meats, cheese products, etc.)
- Coordinated installation of pilot-scale food processor and developed protocol to mimic industrial-scale processed cheese product.
- Directly communicated with industrial partners to troubleshoot product performance issues, and convey research findings.

M.Sc. Student under Dr. Vladimir Lalizhansky **Sept. 2008 – Dec. 2010**
Protein NMR Group, *University of Guelph*

Thesis: ***Characterization of Side Chain Dynamics in a Microcrystalline Protein by Solid State Nuclear Magnetic Resonance (NMR) Spectroscopy***

- Synthesized, purified, and crystallized isotopically labeled proteins expressed in *E. coli*
- Performed Magic Angle Spinning Solid State NMR experiments on protein samples
- Developed and implemented theoretical simulations to fit experimental NMR data

Research Assistant under Dr. Vladimir Lalizhansky **May 2008 – Sept. 2008**
Protein NMR Group, *University of Guelph*

- Performed NMR experiments and complementary theoretical simulations on model peptides and proteins
- Purified and crystallized protein samples for future NMR experiments

Undergraduate research project under Dr. John Dutcher **Jan. 2008 – April 2008**
Polymer and Surface Interface Group, *University of Guelph*

- Used Digital Inline Holographic Microscopy (DIHM) to visualize the self-assembly of polystyrene microspheres in three spatial dimensions
- Developed a protocol for visualizing the self-assembly process using DIHM
- Investigated particle density threshold of DIHM

Extracurricular Activities

- Rock climbing / bouldering
- Biking
- Hiking / camping
- Learning French (verbal, reading, writing)