

# Uri Lesmes, Ph.D.

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## **Academic Background**

- 2010-Present Assistant Professor**, Faculty of Biotechnology and Food Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 2008-2010 Post Doctoral Research Associate & Lecturer**, Department of Food Science, University of Massachusetts - Amherst, MA, USA.
- 2004-2008 Ph.D (direct path)**, Faculty of Biotechnology and Food Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 2000-2004 B.Sc (cum laude)**, Faculty of Biotechnology and Food Engineering, Technion-Israel Institute of Technology, Haifa, Israel.

## **Research Interests**

- **Food Chemistry and Biochemistry:** Fabrication and characterization of novel food-grade ingredients and formulations. Physicochemical basis of digestion. Food-omics and personalization/tailoring of foods. Prebiotics and antioxidants and their role in foods.
- **Food technology:** Novel strategies to rationally design food colloids and interfaces. Development of structured emulsions and other advanced formulations. Linking food physicochemistry to health and well-being.
- **Emerging food Science and technology:** In-Vitro models of the gastrointestinal tract, structure-function relationships, metabolomic and proteomic analyses of foods. Impact of processing on food safety.

## **Academic/Professional Experience**

- 2009**            **Lecturer**, Food Processing (FS561), Department of Food Science, University of Massachusetts - Amherst, MA, USA.
- 2007-2008**    **Senior teaching assistant**, “Laboratory in analysis of foods and biological materials”, Faculty of Biotech. and Food Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 2005-2007**    **Teaching assistant**, “Laboratory in analysis of foods and biological materials” and “Principles of Food Engineering and Biotechnology 3”, Faculty of Biotech. and Food Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 2005**            **Visiting Scholar**, EU funded Short term scientific mission at the Food Microbial Sciences Unit, Food Biosciences, Reading University, UK.

## **Honors and Prizes**

- 2012**            The Technion award for excellence in teaching – top 4%.
- 2008**            Irwin and Joan Jacobs Fellowship, Technion Graduate School, Technion – Israel Institute of Technology.
- 2007**            Elected as one of the top 16 Food Engineering and Technology PhD students in Europe by The Section on Food of the European Federation of Chemical Engineering (EFCE) and the European Federation of Food Science and Technology (EFFoST).
- 2007**            The Russell Berrie Scholarship for excellence in Nanoscience and Nanotechnology, Technion – Israel Institute of Technology.
- 2006**            Howard and Anne Gottlieb Fellowship, Technion – Israel Institute of Technology.
- 2005**            The George E. Klein Fellowship, Technion – Israel Institute of Technology.
- 2005**            EU 01281 STSM grant, Studying Resistant Starch impact on human colon flora.
- 2005**            Excellence scholarship, Food Manufacturers Association of Israel, Israel.

## **PUBLICATIONS**

### **THESIS**

1. Effects of guest and host chemistry on the structure and functionality of amylose-based nanocapsules. PhD Thesis, Department of Biotechnology and Food Engineering, Technion, Haifa, Israel, (2008). Supervisor: Assoc. Prof. Eyal Shimoni.

### **PEER REVIEWED PAPERS IN PROFESSIONAL JOURNALS**

#### **PUBLISHED PAPERS**

1. Shimoni, G., Shani Levi, C., Levi Tal, S. and Lesmes, U. (2013) Emulsions stabilization by lactoferrin nano-particles under in vitro digestion conditions, *Food Hydrocolloids*, Accepted – DOI: 10.1016/j.foodhyd.2013.03.017.
2. Shani Levi, C., Levi Tal, S. and Lesmes, U. (2013). Comparative performance of milk proteins and their emulsions under dynamic in vitro adult and infant gastric digestion, *Food Hydrocolloids*, 32, 2, 349-357.
3. David-Birman, T., Mackie, A. and Lesmes, U. (2013). Impact of dietary fibers on the properties and proteolytic digestibility of lactoferrin nano-particles. *Food Hydrocolloids* 31(1): 33–41.
4. Tokle, T., Lesmes, U., Decker, E.A. and McClements D.J. (2012). Impact of dietary fiber coatings on behavior of protein-stabilized lipid droplets under simulated gastrointestinal conditions. *Food and Function*, 3, 58-66.
5. Lesmes, U. and McClements, D.J. (2012). Controlling Lipid Digestibility: Response of lipid droplets coated by  $\beta$ -lactoglobulin-dextran Maillard conjugates to simulated gastrointestinal conditions. *Food Hydrocolloids*, 26, 1, 221-230.
6. Schmelz, T., Lesmes, U., Weiss, J. and McClements, D.J. (2011). Modulation of physicochemical properties of lipid droplets using  $\beta$ -lactoglobulin and/or lactoferrin interfacial coatings, *Food Hydrocolloids*, 25, 1181-1189.
7. Tokle, T., Lesmes, U. and McClements D.J. (2010). Impact of electrostatic deposition of anionic polysaccharides on the stability of oil droplets coated by lactoferrin. *Journal of Agricultural and Food Chemistry*, 58, 17, 9825-9832.
8. Lesmes, U., Baudot, P. and McClements, D.J. (2010). Impact of interfacial composition on physical stability and *in vitro* lipase digestibility of triacylglycerol oil droplets coated with lactoferrin and/or caseinate, *Journal of Agricultural and Food Chemistry*, 58, 13, 7962–7969.

9. Matalanis, A., **Lesmes, U.**, Decker, E.A. and McClements, D.J. (2010). Fabrication and Characterization of Filled Hydrogel Particles based on Sequential Segregative and Aggregative Biopolymer Phase Separation. *Food Hydrocolloids*, 24, 689-701.
10. Peinado, I., **Lesmes, U.**, Andres, A. and McClements, D. J. (2010). Fabrication and morphological characterization of biopolymer particles formed by electrostatic complexation of heat treated lactoferrin and anionic polysaccharides, *Langmuir*, 26, 12, 9827–9834.
11. **Lesmes, U.**, Sandra, S., Decker, E. A. and McClements, D. J. (2009). Impact of surface deposition of lactoferrin on the physical and chemical stability of omega-3 rich oil droplets stabilized by caseinate. *Food chemistry*, 123, 1, 99-10.
12. Jones, O. G., **Lesmes, U.**, Decker, E. A., Dubin, P. and McClements, D. J. (2009). Effect of Polysaccharide Charge on Formation and Properties of Biopolymer Nanoparticles Created by Heat Treatment of  $\beta$ -Lactoglobulin-Pectin Complexes. *Food Hydrocolloids*, 24, 4, 374-383.
13. Zabar, S., **Lesmes, U.**, Katz, I., Shimoni, E. and Bianco-Peled, H. (2009). Structural characterization of amylose-long chain fatty acid complexes produced via the acidification method. *Food hydrocolloids*, 24, 4, 347-357.
14. Zabar, S., **Lesmes, U.**, Katz, I., Shimoni, E. and Bianco-Peled, H. (2009). Studying different dimensions of amylose-long chain fatty acid complexes: molecular, nano and micro level characteristics. *Food hydrocolloids*, 23, 7, 1918-1925.
15. **Lesmes, U.**, Sner, Y., Cohen, S., and Shimoni E. (2009). Effects of long chain fatty acid unsaturation on the structure and controlled release properties of amylose complexes, *Food Hydrocolloids*, 23, 3, 667-675.
16. **Lesmes, U.**, Barchechath, J. and Shimoni, E. (2008). Continuous dual feed homogenization for the production of starch inclusion complexes for controlled release of nutrients, *Innovative Food Science and Emerging Technologies*, 9, 4, 507-515.
17. **Lesmes, U.**, Breads, E. J., Gibson, G. R., Tuohy, K. M. and Shimoni, E. (2008). Effects of Resistant Starch Type III Polymorphs on Human Colon Microbiota and Short Chain Fatty Acids in Human Gut Models, *Journal of Agricultural and Food Chemistry*, 56, 13, 5415–5421.

## REVIEW PAPERS

1. Benschitrit, R., Shani Levi, C., Tal Levi, S., Shimoni, E. and **Lesmes, U.** (2012). Development of oral food-grade delivery systems: current knowledge and future challenges. *Food and Function*, 3, 10-21. *Selected as cover article*
2. Normand, M.D., **Lesmes, U.**, Corradini, M. G. and Peleg, M. (2010). Free Interactive Software for Food Engineering Education and Practice, *Food Engineering Reviews*, 2, 157–167.
3. **Lesmes, U.** and McClements, D. J. (2009). Structure-Function Relationships to Guide Rational Design and Fabrication of Particulate Food Delivery Systems. *Trends in food science & technology*, 20, 10, 448-457.

## PATENTS

2006 Shimoni, E., **Lesmes, U.** and Ungar, Y., Non-covalent nanocomplexes of bioactive agents with starch for oral delivery. PCT Patent Application IL2007/000511.

## BOOK CHAPTERS AND OTHER PUBLICATIONS

1. Elad, A.M. and **Lesmes, U.** Nutritional Programming of Probiotics to Promote Health and Well Being. In "Probiotics" (2012). Edited by Rigobelo, E. InTech - open science on-line publishing available on-line:  
<http://www.intechopen.com/articles/show/title/nutritional-programming-of-probiotics-to-promote-health-and-well-being>
2. **Lesmes, U.** Prebiotics – modulators of the human gut microflora. In "Beneficial Microorganisms in Multicellular Life Forms" (2011). Rosenberg, E. and Gophna U. Eds. Springer publishing.
3. Normand, M.D., **Lesmes, U.** and McClements, D.J. (2010). Model for the formulation of multilayered emulsions. Free Interactive demonstration, Wolfram Demonstrations Project, Available On-line  
<http://demonstrations.wolfram.com/ModelForTheFormulationOfMultilayeredEmulsions/>
4. **Lesmes, U.** and Peleg, M. (2009). Free Software for food processing and engineering courses. Course material for Food Processing (FS561) and Food Engineering (FS571), Dept. of Food Science, University of Massachusetts - Amherst, MA, USA.
5. **Lesmes, U.** and Fishman, A. (2007). Analysis of Food and Biological Materials – Laboratory Handbook, Course material for Laboratory in Analysis of Food and Biological Materials (064326), Faculty of Biotechnology and Food Engineering, Technion – Israel Institute of Technology, Haifa, Israel.

## **CONFERENCES**

### **PARTICIPATION IN CONFERENCE/SYMPOSIUM ORGANIZATION**

1. 5th International Symposium on Delivery of Functionality in Complex Food Systems - Physically-Inspired Approaches from the Nanoscale to the Microscale (2013), Haifa, Israel. **Scientific Committee member.**
2. 2nd International Conference on Food digestion (2013), Madrid, Spain. **Session chair.**
3. **Organizer** of " "Food Engineering in the 21st century – Novel approaches and Technologies for promoting health" (2012). Symposium honoring Prof. Zeki Berk on his 80th birthday, Technion, Haifa, Israel.
4. IFT 2010 Annual meeting, July 2010, Chicago, IL, USA. **Session Moderator (Co-chair)** for session on “Rational design of food delivery systems: physicochemical basis of food component digestion, release and absorption”. IFT 2010 annual meeting, Chicago, IL.

### **INVITED TALKS**

1. **Lesmes, U. (2012).** Harnessing natural reactions and interactions to modulate emulsion behaviour in the gastrointestinal tract: Insights from *in vitro* gastrointestinal models. The First International Conference on Food Digestion, Cesena, Italy.
2. **Lesmes U. (2011).** Engineering food for health: Modulating emulsion functionality through natural modifications of droplet coatings. Food in the new era national conference, Tel-Aviv, Israel.
3. **Lesmes U. (2011).** Understanding how food structure modulates GI flora & contents. Bat Sheva meeting on the role of microorganisms in the adaptation and evolution of animals (including man) and plants, Ein Gedi, Israel.
4. **Lesmes U. (2011).** Modulating emulsion functionality through natural modifications of droplet coatings. The Casali Institute of Applied Chemistry, The Hebrew University, Jerusalem, Israel.
5. **Lesmes, U. (2010).** Protein-polysacchride interactions and bioconjugates: impact on emulsion stability and lipase digestibility, IFT 2010 annual meeting, Chicago, IL, USA.
6. **Lesmes, U. and Shimoni, E. (2007).** Nano-food engineering: amylose-based nanocapsules as edible controlled delivery systems (*Showcase Lecture*), Irwin and Joan Jacobs Graduate School, Technion – IIT.
7. **Lesmes, U. and Shimoni, E. (2007).** Functionality of amylose-based nanocapsules as controlled delivery systems for bioactive fatty acids (*Prize Lecture*), The First European Workshop on Food Engineering and Technology, Berlin, Germany.

## CONTRIBUTED TALKS

1. David-Birman, T., Cohen L. A., Meyron-Holtz, E. G., Mackie, A. and **Lesmes, U. (2013)**. Dietary carrageenan interferes with gastric proteolysis and may affect gastrointestinal health. The 2nd International Conference on Food digestion, Madrid, Spain.
2. Birman, T., Mackie, A. and **Lesmes, U. (2012)**. The proteolysis of lactoferrin-based nano-particles under simulated gastrointestinal conditions is affected by electrostatic deposition of anionic polysaccharides. The 11th international hydrocolloids conference, Purdue University, Indiana, USA.
3. Shani Levi, C., Shimoni, G. and **Lesmes, U. (2012)**. Impact of lactoferrin-based nano-particles on emulsion stability and behaviour during in vitro gastrointestinal digestion. The 11th international hydrocolloids conference, Purdue University, Indiana, USA.
4. Meshulam, D., Tamir, O., Tokle, T., McClements, D.J. and **Lesmes, U. (2012)**. Design of emulsion droplet interfaces to modulate emulsion digestion: insights from in vitro gastrointestinal models. The 11th international hydrocolloids conference, Purdue University, Indiana, USA.
5. **Lesmes, U. (2011)**. Application of in vitro methods to link structure to foods functionality during human digestion. COST FA1001 meeting on Food Structure Engineering and Healthy Functions: Experimental Approaches, Vienna, Austria.
6. **Lesmes, U. & McClements, D.J. (2011)**. Behavior of Emulsions Stabilized by Maillard-based Glycoconjugates Under Simulated Gastrointestinal Conditions. The 11th International Congress on Engineering and Food, Athens, Greece.
7. **Lesmes, U. (2011)**. In vitro studies of the human gastrointestinal microflora response to food ingredients – resistant starch as an example. Israel Society for microbiology (ISM) - Annual Meeting, Ramat-Gan, Israel.
8. **Lesmes, U., Breads, E. J., Gibson, G. R., Tuohy, K. M. and Shimoni, E. (2007)**. Prebiotic effects of thermally produced resistant starch polymorphs, COST 927 action on Thermally Processed Foods: possible health implications, Workshop in Sofia, Bulgaria.
9. **Lesmes, U., Tuohy, K.M. & Shimoni, E. (2006)**. Testing the prebiotic effects of polymorph A of type III Resistant Starch on the human colon flora, Israel Society for Microbiology (ISM) 2006 annual meeting, Beer-Sheva, Israel.

## REFEREED ABSTRACTS AND POSTERS IN CONFERENCES

1. Joubran, Y., Mackie, A. and **Lesmes, U. (2013)**. Impact of the Maillard reaction on some health-related properties of lactoferrin. Proceedings of InsideFood symposium, Leuven, Belgium.
2. Shainsky-Roitman, J. Levi Tal, J. Kaplan, E. Ben-Yosef, G. and **Lesmes U. (2013)**. Improving the survivability of probiotics embedded in confectionary using *in vitro* models simulating infant, pre-adolescent and adult gastric conditions. The 2nd International Conference on Food digestion, Madrid, Spain.
3. Moscovici, A.M., Dupont, D. and **Lesmes, U. (2013)**. Impact of Maillard reaction on the proteolysis of lactoferrin under simulated infant gastric-duodenal conditions. The 2nd International Conference on Food digestion, Madrid, Spain.
4. Meshulam, D. Shimoni, G., Levi-Tal, S. and **Lesmes U. (2013)**. Impact of lactoferrin-based nano-particles on emulsion stability and behaviour during *in vitro* gastrointestinal digestion. The 2nd International Conference on Food digestion, Madrid, Spain.
5. Joubran, Y., Elad, A.M. and **Lesmes, U. (2012)**. Impact of the Maillard Reaction on Some Health-Related Properties of Lactoferrin. EFFoST 2012 Annual Meeting, Montpellier, France.
6. Perez O. E., Keselman E. and **Lesmes, U. (2012)**. Impact of folic acid on  $\beta$ -lactoglobulin and fabrication of nanocomplexes at neutral pH. EFFoST 2012 Annual Meeting, Montpellier, France.
7. Elad, A., Meshulam, D., Tamir, O. and **Lesmes, U. (2012)**. Structural and functional properties of lactoferrin Maillard-based conjugates. The 11th international hydrocolloids conference, Purdue University, Indiana, USA.
8. Birman, T., Mackie, A. and **Lesmes, U. (2012)**. Impact of electrostatic deposition of anionic polysaccharides on the functionality of lactoferrin nano-particles under simulated gastric conditions. Israel Chemical Society (ICS) 77th annual meeting, Ramat-Gan, Israel.
9. Birman, T., Mackie, A. and **Lesmes, U. (2012)**. Impact of dietary fibres on the proteolysis of lactoferrin-based nano-particles under simulated gastrointestinal conditions. The 1st international conference on food digestion, Cesena, Italy.
10. Birman, T., Mackie, A. and **Lesmes, U. (2012)**. Modulating the digestibility of lactoferrin via formation of nano-particles and electrostatic deposition of anionic polysaccharides. Nano Israel – the third international nanotechnology conference & exhibition, Tel-Aviv, Israel.



11. Meshulam, D., Tamir, O., Levi Tal, S. and **Lesmes, U. (2011)**. Impact of bovine lactoferrin-dextran Maillard conjugation on emulsion physical stability. The first Conference of the Israel Society for Biotechnology Engineering, Ramat Gan, Israel.
12. Shani Levi, C., Levi Tal, S. and **Lesmes, U. (2011)**. Infant and adult dynamic in vitro gastric model: studying milk protein and emulsion digestibility. The first Conference of the Israel Society for Biotechnology Engineering, Ramat Gan, Israel.
13. **Lesmes, U., Decker, E.A. and McClements, D.J. (2010)**. Impact of Lactoferrin on the stability of fish oil emulsions stabilized by sodium caseinate. Food Colloids 2010, Granada, Spain.
14. **Lesmes, U., Decker, E.A. and McClements, D.J. (2009)**. Caseinate-Lactoferrin Electrostatic Interactions Promote the Stability of Multilayered Emulsions. Center for UMass Industry Research on Polymers 2009 annual meeting, Amherst, MA, USA.
15. Cohen, R., Orlova, Y., Kovalev, M., Ungar, Y., **Lesmes U.** and Shimoni, E. (2008). Encapsulation of genistein in amylose complexes, Proceedings of XVI International Conference on Bioencapsulation, Dublin, Ireland.
16. Shimoni, E. and **Lesmes, U. (2008)**. Producing starch nanoparticles as vehicles for encapsulation (*Selected as one of top 10 papers*). Proceedings of ICEF10 International Food Engineering Congress, Vina del-Mar, Chile.
17. **Lesmes, U., Cohen, R., Ades, H. and Shimoni, E. (2007)**. Using starch molecular complexes as carriers for therapeutics and nutrients. Proceedings of The XVth International Workshop on Bioencapsulation, Vienna, Austria.
18. **Lesmes, U., Breads, E. J., Tuohy, K. M. & Shimoni, E. (2007)**. Resistant Starch polymorphism effects on human colon flora composition and metabolic activity, Israel Society for Microbiology (ISM) 2007 annual meeting, Ramat-Gan, Israel.
19. Breads, E. J., **Lesmes, U., Shimoni, E., Gibson, G. R. & Tuohy, K. M. (2006)**. Testing prebiotic effects of thermally produced resistant starch polymorphs, Royal Society of Chemistry: Food Group, Leeds, UK.
20. **Lesmes, U. & Shimoni, E. (2006)**. Effects of Guest Nutraceutical Structure on the Structure of Amylose Based Molecular Nanocapsules, Israel Chemical Society (ICS) 70th meeting, Tel-Aviv, Israel.
21. **Lesmes, U., Lalush, I. & Shimoni E. (2005)**. Amylose based Molecular Nanocapsules for Conjugated Linoleic Acid, Israel Chemical Society (ICS) 69th meeting, Tel-Aviv, Israel.