



University of Massachusetts
Department of Food Science Newsletter
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Lili He Wins Two National Awards



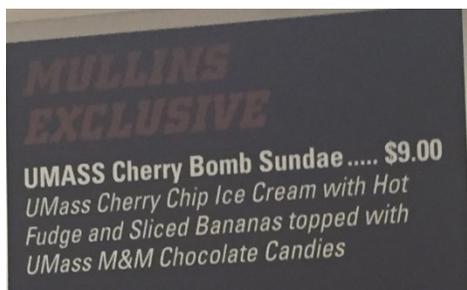
Lili He won the Young Scientist Award from the Agricultural and Food Chemistry Division of the American Chemical Society. This award is given to the most outstanding scientist in a competition between 6 young scientists at the 250th American Chemical Society meeting in Boston.

Lili also received the Eastern Analytical Symposium Young Scientist Award. The Eastern Analytical Symposium and Exposition is held each year to provide professional scientists and students continuing education in the analytical and allied sciences.

UMass Food Science Receives 5 Agriculture and Food Initiative Grants for over \$2.4 Million

For the first time in UMass Food Science history, the Department received 5 USDA-AFRI grants for over \$1.9 million. The faculty recipients were Guodong Zhang, Lili He, Sam Nugen, Hang Xiao and Eric Decker. These awards continue the unprecedented success of the Food Science research program as annual research expenditures have increased from \$1.1 M in 2010 to 2.0 M in 2015. Increased research funding has resulted in a rise in graduate students from 38 in 2010 to 81 in 2015. Even more amazing is that the Department now has 55 PhD students.

UMass Cherry Bomb Ice Cream Now a Mullins Center Exclusive



As reported in the last newsletter, the ice cream developed by our 2015 Food Processing class is now commercial. Our sponsor, Maple Valley Farms, is selling ice cream at all Mullin's Center events and is marketing our ice cream flavor in an exclusive sundae.

UMass Amherst Food Scientist Will Study Pesticides In and On Fresh Produce



By Janet Lathrop – Food scientist and analytical chemist Lili He at the University of Massachusetts Amherst recently received a three-year, \$473,628 grant from the USDA National Institute for Food and Agriculture to study mechanisms of how chemical pesticides, applied both systemically and to the surface, penetrate fresh produce and move into plant tissues, and how this may affect food safety for consumers.

Dr. He is an expert in a technique called Surface-Enhanced Raman Spectroscopy (SERS), which can detect trace amounts of compounds in a sample. She has developed an innovative SERS method for studying pesticides on and in fresh produce without mashing up the sample.

Her research will focus on apples, grapes and leaf spinach as representatives of three different skin structures in fruits and vegetables: Apples have a thick skin that can be peeled, grapes have an ultra-thin skin that is usually not peeled and spinach has no skin.

“One thing we want to know is whether pesticides applied to these different skin surfaces penetrate the skin and how far, and if they can be easily washed off,” He says. “From some preliminary experiments, we know that non-systemic pesticides applied to the surface of fruits and vegetables can penetrate the skin by several microns which would be very hard to wash away, but it has not been studied thoroughly,” she adds.

Studying this penetration has been very difficult, He says, and until recent technology advances including SERS, there has not been a good way. For example, earlier studies of pesticide residue in produce involved mashing up the sample and extracting pesticide from the paste. But SERS techniques can do better than that, that is, no need to mash up the sample, she notes.

He and colleagues will buy organic apples and grapes and will add pesticides to the surface for some of the experiments and will grow spinach in the campus greenhouse for testing both topical and systemic pesticides.

John Clark, director of the UMass Pesticide Laboratory, will validate He’s test results and Amanda Kinchla, extension food scientist, will also conduct experiments to determine whether traditional produce washing methods used for fruit and vegetables that are usually intended to remove bacteria can also help to reduce pesticide residue.

UMass Amherst Food Scientist to Study Reducing Saturated Fats in Popular Foods



By: Janet Lathrop – University of Massachusetts Amherst food scientist Eric Decker has received a three-year, \$469,775 grant to explore ways to improve the nutrition of foods high in saturated fats. Results should help food producers address recent new dietary guidelines recommending that Americans eat fewer of those fats to reduce heart disease risk.

The top three contributors of saturated fat in the American diet are crackers, cookies and granola bars, he explains, all of which are low in moisture, so reformulating them to reduce saturated fat content is challenging. Since these fats are replaced by liquid oils, the reformulation can reduce shelf life and nutrition and affect texture and flavor. Decker, professor and head of the Food Science Department, received the funding from the U.S. Department of Agriculture's Agriculture and Food Research Initiative (AFRI).

Decker says, "Improving the nutritional profiles of these products by substituting their saturated fatty acids with unsaturated fatty acids could have an important, positive impact on consumer health. However, it's a challenge because fats high in saturated fatty acids are solid at room temperature and these solid fats play an important role in the texture of low-moisture foods; it could also have a negative impact on product quality."

For this work, Decker and professors Lili He and D. Julian McClements will conduct a series of experiments using different fat types, antioxidants and processing conditions for making crackers to determine how different treatments and ingredients in low moisture foods affect how quickly they become rancid and whether this can be prevented. They will use a special food dye to mark fats in each experimental batch and a confocal microscope to visualize the crackers' microstructure, condition of fatty acids in the mix and the ability of each recipe to resist rancidity.

The researchers hope to find a way that both large and small food processing companies that produce low-moisture foods can use more unsaturated fats, making these foods healthier. Another benefit of preventing these fats, or lipids, from going rancid will be to help decrease the estimated 40 percent of food produced on the farm from being wasted due to spoilage, Decker adds, which costs over \$180 billion in food per year.

Overall, Decker says he hopes this project will systematically develop a better understanding of the factors that affect fat spoilage in low-moisture foods. Through this knowledge, he and colleagues may be able to develop new technologies to prolong the shelf-life of low moisture foods, decreasing spoilage and reducing waste.

New Product Development Competition



<http://www.machinepoint.com>

We are excited to announce that there is a new product development experience available to UMass Food Science students! Herbalife donated \$36,000 to sponsor a product development competition. Students will be required to identify novel approaches for the development of new food products through hands-on classroom laboratory experiences where they will identify and develop marketing concepts, source commercially available ingredients, develop product formulations, calculate raw material costs and develop ingredient and nutrition fact labels. Matt Steffens (BS '89, MS '92), will work with the students to provide technical guidance, development coaching and monitor overall product development needs. The winning team will receive scholarships and will be eligible for a paid internship position at Herbalife during the summer of 2016.

Faculty News

Amanda Kinchla presented at the annual International Food Protection Association meeting with research titled, “Application of Bacteriophage Cocktail in Leafy Green Wash Water to Control Salmonella Enterica”. She also held short courses on Product Development Success, Better Process Control School and Introduction to HACCP for over 70 food industry participants. She also gave a talk at the New England Fruit and Vegetable Conference held in New Hampshire.

Eric Decker’s research group gave 4 presentations at the Euro Lipid Federation meeting in Florence, Italy. He also presented a lipid oxidation short course and keynote lecture at the World Conference on Fats and Oils in Rosario, Argentina and a talk on the benefits of processed foods at the Food and Nutrition Conference and Expo (Academy of Nutrition and Dietetics) in Nashville.

Lili He and her lab group gave 10 oral and poster presentations at the annual meetings of the American Chemical Society, International Association for Food Protection, Sustainable Nanotechnology Organization and a Gordon Conference at Bentley University.

Julie Goddard received the Junior Moulton Medal from the Institution of Chemical Engineers (IChemE, Rugby, UK) for the publication “Antifouling surface modified stainless steel for food processing” published in Food & Bioproducts Processing. Julie was also the co-chair of a session on nanoparticles in food, agricultural, and environmental settings at the 2015 Fall ACS Meeting in Boston, MA.

Julian McClements is now the most highly cited author in the field of Agricultural Sciences (#1 of 4498 scientists, Essential Science Indicators, Thomson Reuters, September 2015). He also has the highest number (30) of "Top Papers" (i.e., papers within top 1% most cited). Julian also published the 3rd edition of his book “Food Emulsions: Principles, Practice and Techniques”.

Sam Nugen gave talks on “Engineered bacteriophages for rapid bacteria separation and determination in agricultural samples” at the Sensors in Food & Agriculture 2015 Cambridge, UK and “Engineering Bacteriophages for Rapid Food and Environmental Bacteria Sensing” at the International Workshop on Biosensors and Bioanalytical Microtechniques for Environmental, Food and Clinical Analyses at Regensburg, Germany

Yeonhwa Park presented a talk at the Euro Lipid Federation in Florence, Italy on “Conjugated Linoleic Acid and Muscle Metabolism”. She was also a moderator at the 5th Cranberry Health Research Conference in Madison, Wisconsin.

Micha Peleg was invited to participate in CYTAL 2015, the annual congress of the Argentinian Association of Food Scientists, Technologists and Engineers in Buenos Aires and gave a talk on “A Fresh Look at Kinetics in Foods.

David Sela was elected Chair of the Maternal, Perinatal, and Pediatric Research Interest Section of the American Society of Nutrition. He also gave a talk on “The genomics and microbial

ecology of breast milk's coevolution with the developing infant microbiome" at the Federal Drug Administration at College Park, MD.

Hang Xiao was invited to give a talk on bioactive food components at both the Natural Health Product Research Society of Canada meeting (London, Ontario) and the 7th International Conference on Polyphenols and Health (Tours, France). Dr. Xiao also showcased his research on how food nanotechnology can improve the health benefits of nutraceuticals at Euro Fed Lipid Congress (Florence, Italy) and Pacificchem (Honolulu, Hawaii).

Guodong Zhang gave a talk on the molecular mechanisms of omega-3 fatty acids in health promotion at the UMass Biotap program and talked to students about the health benefits of omega-3 fatty acids during the UMass Dining's Alaska Seafood Week.

Student News:

Rising Researcher, Destined for Success

Undergraduate researchers make early impacts in their chosen fields



The terminology in Food Science major Elvira Sukamtoh's area of research can twist your tongue, but the talented food science major has no problem racking up research accomplishments in her field, says Guodong Zhang, Assistant Professor of Food Science. Sukamtoh's research in Zhang's lab has focused on the effects and mechanisms of dietary compounds on angiogenesis (formation of new blood vessels) and lymphangiogenesis (formation of new lymphatic vessels), two critical processes in cancer progression. Using a variety of cell culture models, Sukamtoh has demonstrated that multiple dietary compounds, such as curcumin, potentially inhibit (lymph) angiogenesis.

"These results are highly significant, because these findings could lead to novel therapeutic or preventive strategies to reduce the risks of cancer," says Zhang.

Sukamtoh's accomplishments include publishing in high-impact journals. She is co-first author on a published paper and co-author on another that is pending in *Molecular Nutrition and Food Research*, arguably one of the best original research journals in food science; and been published as co-author in the *Journal of Nutritional Biochemistry*. Sukamtoh has also won travel awards to give oral and poster presentations at national undergraduate research symposia, including the 2015 Institute of Food Technologists national meeting, where she won second place in the undergraduate research competition.

"These outstanding accomplishments have placed her among the most promising young researchers. She is very hard-working, creative, and interactive. Simply put, she is the best student I have observed," notes Zhang.

Other Student Awards:

Cansu Gumus (Adviser McClements) received the Teranishi Fellowship from the American Chemical Society-Agricultural and Food Chemistry Division.

Zhiyun Zhang (Adviser He) receives the Sustainable Nanotechnology Organization student travel award.

ChiAn Lee (Adviser Labbe), presented a poster on *Clostridium botulinum* type B in foods at the Journey through Science Day hosted by PepsiCo and NY Academy of Sciences at the World Trade Center.

Jonah Einson (Adviser Sela) was awarded a prestigious American Society for Microbiology Summer Undergraduate Research Fellowship.

Stephanie Andler (Adviser Goddard) led a group of graduate and undergraduate students to teach “Funtastic Food Science” as part of the campus-wide k-12 STEM outreach event, ScienceQuest.

Shintaro Pang (Adviser He) received 2nd place in the IFT Global Student Innovation Challenge.

David Johnson (Adviser Decker) received a \$10,000 Smouse Scholarship from the American Oil Chemist Society.

Troy Hinkley (Adviser Nugen) received a USDA fellowship and won “Best Talk” at the Pioneer Valley Microbiology Symposium