IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor	:	Rachel Fraser	Art Unit	:	1791
Serial No.	:	14/797,006	Examiner	:	Elizabeth A. Gwartney
Filed	:	July 10, 2015			
			Conf. No.	:	8496
Title	:	METHODS AND COMPOSITIONS FOR AFFECTING THE FLAVOR AND AROMA PROFILE OF CONSUMABLES			

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 CFR § 1.132

I, Devin Grant Peterson, PhD, hereby declare as follows:

1. I am currently a Professor in the Department of Food Science and Technology at the Ohio State University in Columbus, Ohio. I have held this position since early 2016. I have worked and taught in the field of Food Science since 2001. Prior to my current position, I held Professor/Associate Professor positions at the University of Minnesota in Saint Paul, Minnesota from 2009 to 2016; and was a faculty member in the Department of Food Science at the Pennsylvania State University in University Park, Pennsylvania from 2001 to 2009. In addition, I have been the Director of the Flavor Research and Education Center for the past seven years, at both the University of Minnesota and the Ohio State University.

2. I am a nationally recognized expert and scholar in the field of flavor science. In 2015, I received the Excellence in Flavor Science Award from the Flavor and Extract Manufacturers Association. In 2008, I received a Pan-American Nutrition, Food Science and Technology Award. In 2004, during my tenure at Pennsylvania State University, I was awarded the Presidential Early Career Award for Scientists and Engineers (PECASE), which was presented by the White House Office of Science and Technology Policy.

3. I received a Bachelor's of Science (B.S.) degree in Food Science in 1994 from the University of Manitoba in Winnipeg, Manitoba. I earned a Master's of Science (M.S.) degree in 1997 and a Doctor of Philosophy (Ph.D.) degree in 2001 in Flavor Chemistry from the Department of Food Science from the University of Minnesota in Saint Paul, Minnesota. I was named to the Dean's List during my academic career at both the University of Manitoba and at the University of Minnesota. While I was obtaining my Ph.D., I completed a six-month Internship as a Research Flavor Scientist at Givaudan Flavors in Cincinnati, Ohio.

4. A copy of my curriculum vitae is attached in **Exhibit A**.

5. My research focuses on food flavor and related chemistry, with an emphasis on identification of flavor stimuli (e.g., taste, aroma, chemesthetic, mouthfeel), pathways of formation and degradation of flavor stimuli, taste and aroma modulation, and mechanisms of delivery.

6. In preparing my Declaration, I have reviewed U.S. Patent Application No. 14/797,006 ("the '006 application"), as well as the Office Action mailed June 6, 2016, in which the claims of the '006 application were rejected as being anticipated by Proulx et al. (2006, J. Agric. Food Chem., 54:1518-22) ("Proulx") and as being obvious considering Hsieh et al. (US 2012/0093994) ("the '994 application") in view of Proulx. I also reviewed the Declaration under 37 CFR § 1.132 of Dr. Celeste Holz-Schietinger ("the Holz-Schietinger Declaration"). A list of the materials I reviewed in preparing this Declaration is provided in **Exhibit B**.

7. In forming my opinion, I reviewed and considered Applicants' experiments related to their discovery and demonstration that the addition of heme protein (in some cases as

leghemoglobin or LegH) surprisingly contributes to the development of meaty aroma in a "ground beef-like food product" comprising no animal products. These experiments are described in the '006 application and in the Holz-Schietinger Declaration.

8. Flavor is a complex sensation, consisting of different modalities such as olfaction (aroma), gustation (sweet, sour, salty, bitter, umami), and chemesthesis (heat, cooling, pain), as well as others. The aroma attributes are known to be a key component of flavor perception and have been the most widely studied by flavor chemists.

9. In my opinion, the scientific protocols in the '006 application and in the Holz-Schietinger Declaration for a) sample preparation and treatment; and b) chemical analysis of aqueous thermal reaction samples are reasonable and consistent with methods that would be used by skilled individuals in the art. Each of these aspects are reviewed in more detail below.

10. The Hotz-Schietinger Declaration describes chemical analysis of aqueous thermal reaction samples using art recognized instrumental aroma analysis methods, specifically HS-SPME combined with GC-MS, to monitor the effect of LegH addition on the formation of volatile compounds, specifically those with meaty aroma characteristics, during heating (i.e., cooking). The objective was to demonstrate that LegH was capable of promoting or catalyzing the formation of meaty aroma compounds via aqueous thermal reactions between ribose and cysteine. Three flavor reaction systems were compared, consisting of: 1) 1% (10 mg/mL) LegH alone (**LegH control**), 2) 50 mM ribose + 50 mM cysteine alone (**Rib + Cyst**) and 3) 1% (10 mg/mL) LegH + 50 mM ribose + 50 mM cysteine (**LegH + Rib + Cyst**). The above reaction mixtures were diluted in a buffer (50 mM potassium phosphate and 100 mM sodium chloride)

and adjusted to pH 6.5, which is near the physiological pH of ground beef. A 2 mL aliquot of each reaction mixture was transferred to sample vials (sealed) which were subsequently heated (150°C for 3 min) and then analyzed by HS-SPME-GC-MS.

11. The concentrations (i.e. 0.1 to 50 mM) of flavor precursors (i.e., ribose and cysteine) of the aqueous thermal reaction samples described in the '006 application and the Hotz-Schietinger Declaration are consistent with peer-reviewed publications that have used similar aqueous reaction samples to investigate the thermal generation of volatile aroma compounds contributing to the flavor sensation of a food product. While aqueous thermal reaction samples are simplistic compared to food matrices, they provide relevant guidance and generalized outcomes for understanding the influence of flavor precursors on the formation of volatile compounds contributing to aroma, and to the flavor sensation generally in a number of different food products.

12. For example, a widely utilized and referenced publication for understanding the impact of flavor precursor composition on the formation of volatile aroma compounds generated therefrom is Lane and Nursten, "Variety of odors produced in Maillard model systems and how they are influenced by reaction conditions" in Maillard Reaction in Foods and Nutrition, Waller and Feather, eds., ACS Symposium, Series No. 215, pp 141-158. This publication describes aqueous combinations of sugar and amino acid mixtures heated under different time and temperature conditions. Lane and Nursten provides directional guidance for flavor development, and how flavor is impacted by flavor precursors, in various types of food matrices.

13. It is my opinion that the experimental approach and subsequent data analysis techniques described in the Holz-Schietinger declaration are appropriate and acceptable for the purpose of evaluating and comparing aroma compound formation in the three aqueous thermal reaction systems under heating conditions. The aqueous thermal reaction samples described in the Holz-Schietinger Declaration are comparable with those described by Lane and Nursten. It is also my opinion that these conditions would simulate the cooking of a "ground beef-like food product" containing no animal products as described in the '006 application, and that the data obtained from the experimental approach would be reasonably predictive of the expected aroma compound formation from a "ground beef-like food product" containing no animal products and including the flavor reaction system components LegH, ribose, and cysteine.

14. It is well known that thermal generation of volatile aroma compounds in an aqueous reaction system is influenced by reaction temperature and pH. When utilizing aqueous reaction samples, the reaction systems often are sealed so they can be pressurized, which increases the temperature of the sample to simulate temperatures in excess of 100°C, which would be experienced with conventional food heating methods such as baking, grilling or pan-frying. The aqueous thermal reaction samples described in the '006 application and in the Holz-Schietinger Declaration were heated in sealed vials at 150°C, which would be consistent with temperatures experienced by common meat preparation (heating) techniques.

15. My research program has similarly utilized the benchtop autosampler apparatus utilized in the '006 application and the Holz-Schietinger Declaration to rapidly heat sealed vials of aqueous samples to between 100-150°C for the purpose of evaluating and comparing aroma

compound formation. See, for example, Kokkinidou and Peterson, 2013, Food Funct., 4:1093-104.

16. The slightly acidic pH value of 6 - 6.5 for the aqueous thermal reaction samples used in the '006 application and the Holz-Schietinger Declaration also are consistent with the typical intrinsic pH values of meat products, as well as with peer-reviewed publications evaluating flavor development, and how it is impacted by flavor precursors, in various types of food matrices, including in meat food products.

17. It is my opinion that the experimental approach and analytical methods used in the '006 application and the Holz-Schietinger Declaration for evaluating and comparing aroma compound formation in aqueous thermal reaction samples were consistent with those used by flavor scientists of ordinary skill in the art. For example, the headspace solid phase micro-extraction (SPME) sampling technique coupled with GCMS utilized in the '006 application and the Holz-Schietinger Declaration has been widely utilized for characterizing the aroma of foodstuffs, such as meat food products. See, for example, Elmore et al., 2001, "A comparison of headspace entrainment on Tenax with solid phase micro-extraction for the analysis of the aroma volatiles of cooked beef," in Headspace Analysis of Foods and Flavors; Rouseff and Cadwallader, eds, Springer. Indeed, more than 100 articles are reported in SciFinder when the key words "meat, aroma, SPME" are set as filters to screen the existing scientific literature.

18. It is well known that the aroma profiles of meat food products are impacted by sulfur-containing compounds (typically, reaction products of sulfur-containing amino acids) and lipid degradation/oxidation products that are generated during heating. The different chemical

classes of volatile compounds formed in the aqueous thermal reaction samples of the '006 application and the Holz-Schietinger Declaration are consistent with volatile aroma compounds reported in the literature evaluating volatile compound formation contributing to meat aroma and flavor sensation. See, for example, Elmore et al. (2002, J. Agric. Food Chem., 50:1126-32); Chen et al. (2003, "Influence of DNA on Volatile Generation from Maillard Reaction of Cysteine and Ribose," *in* Nutraceutical Beverages, ACS Symposium Series Vol 871); Mottram and Nobrega (2002, J. Agric. Food Chem., 50(14):4080–86); Schieberle and Hofmann ("Characterization of Key Odorants in Dry-Heated Cysteine—Carbohydrate Mixtures: Comparison with Aqueous Reaction Systems," *in* Flavor Analysis, ACS Symposium Series, Vol 705); Mottram and Mottram (2002, "An Overview of the Contribution of Sulfur-Containing Compounds to the Aroma in Heated Foods," *in* Heteroatomic Aroma Compounds, ACS Symposium Series, Vol 826); and Shu-C and Ho (1989, "Parameter Effects of the thermal reaction of cysteine and 2,5-dimethyl-4-hydroxy-3(2H)-furanone," *in* Thermal Generation of Aromas, ACS Symposium Series, Vol 409).

19. In my opinion, Applicant's experiments in the '006 application and the Holz-Schietinger Declaration demonstrate that the addition of LegH to an aqueous thermal reaction mixture comprising ribose and cysteine has the surprising result of enhancing the formation of volatile compounds associate with a meaty aroma. Significantly, the 2,851-fold increase in concentration of 2-acetylthiazole when LegH was combined with Ribose and Cysteine, which is shown in the Holz-Schietinger Declaration, in my opinion signifies that novel and unexpected chemical reactions occur in the presence of LegH. 2-acetylthiazole is particularly interesting as

it has been associated in the literature with a meaty/roasty aroma. See, for example, Chemistry and Technology of Flavours and Fragrances, 2005, Ed Rowe, Blackwell Publishing Ltd; Flavor of Meat and Meat Products, 1994, Ed Shahidi, Springer-Science+Business Media, BV; Handbook of Meat and Meat Processing, 2012, 2nd Ed, Ed Hui, CRC Press; Mottram and Mottram (2002, "An Overview of the Contribution of Sulfur-Containing Compounds to the Aroma in Heated Foods," *in* Heteroatomic Aroma Compounds, ACS Symposium Series, Vol 826); and Chen and Ho (2002, J. Agric. Food Chem., 50(8):2372–76).

20. Yield changes of 0.5- to 10-fold would be consistent with optimizing a reaction pathway, however, changes of greater than 1000-fold, as is seen with 2-acetylthiazole, indicate that new pathways of formation for meaty aromas result from the inclusion of LegH in the aqueous thermal reaction mixture.

21. Additionally, the Holz-Schietinger Declaration demonstrates that 2-methyl-3-furanthiol (MFT) and the major degradation product of MFT, the dimer, bis(2-methyl-3-furyl) disulfide, were detected only in the aqueous thermal reaction samples that contained Leghemoglobin. MFT is a very potent meaty odorant, with an extremely low odor threshold at 0.007 μg/kg in water, and is known to have an important contribution to meat aroma. See, for example, Kerscher and Grosch (1998, J. Agric. Food Chem., 46:1954-58); Tang et al. (2013, J. Sulfur Chem., 34:38-47); and Withcombe and Mussinan (1988, J. Food Sci., 53:658-60). It is surprising to me that an intense meaty aroma compound such as MFT was uniquely identified in the reaction mixture upon the addition of LegH.

22. I hereby declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Respectfully submitted,

Date: Dec 2, 2016

Devin Grant Peterson, Ph.D.

EXHIBIT A

2249 Carter Avenue
Saint Paul, MN 55108

PHONE: (651) 308 3546
E-MAIL: devin.g.peterson@gmail.com

Devin G Peterson

Experience:

Aug/16 **Professor** **Food Science & Technology** **Director of the Flavor Research & Education Center**	The Ohio State University	Columbus, OH
June/12 – Aug/16 **Professor** **Food Science & Nutrition** **Director of the Flavor Research & Education Center**	The University of Minnesota	St. Paul, MN
Aug/09 – June/12 **Associate Professor** **Food Science & Nutrition** **Director of the Flavor Research & Education Center**	The University of Minnesota	St. Paul, MN
July/07 – Aug/09 **Associate Professor/Food Science**	The Pennsylvania State University	University Park, PA
March/01 – June/07 **Assistant Professor/Food Science**	The Pennsylvania State University	University Park, PA
Dec/99 – Feb./01 **Research Assistant**	University of Minnesota	St. Paul, MN
July/99 - Dec./99 **Research Flavor Scientist (Internship)**	Givaudan Flavors	Cincinnati, OH
Sept./94 - July/99 **Research Assistant**	University of Minnesota	St. Paul, MN
June/94 –Aug./94 **Information Technician**	The Canadian Wheat Board	Winnipeg, MB
May – Aug./92&93 **QC Technician**	Coca-Cola Bottling Company	Winnipeg, MB

Education:	1997 - 2001 **PhD/Food Science** (Dean's List)	University of Minnesota	St. Paul, MN
	1994 - 1997 **MS/Food Science** (Dean's List)	University of Minnesota	St. Paul, MN
	1990 – 1994 **BS/Food Science** (Dean's List)	University of Manitoba	Winnipeg, MB

Awards:	Flavor and Extract Manufacturers Association - Excellence in Flavor Science Award	2015
	Waters Centers of Innovation Award	2012
	Pan-American Nutrition, Food Science and Technology Award	2008
	Presidential Early Career Award for Scientist and Engineers (PECASE)	2004
	John Brandt Memorial Foundation Scholarship; National	2000
	M. E. Franks Scholarship; National	1998, 1999 & 2000
	IFT Grad. Fellowship–Soc. of Flavor Chemists Memorial; National	1998/99 & 2000/01
	AACC Graduate Fellowship; National	1997/98
	IFT Scholarship; Minnesota	1997 & 2000
	Triticus Award; Departmental	1996
	The Canadian Wheat Board Scholarship; National	1994

Peer Reviewed Publications (*italics* is corresponding author):

1. Raithore, S. and ***Peterson, D.G.*** 2016. Delivery of taste and aroma components in sugar-free chewing gum: mass balance analysis. Chemosensory Perception. *Accepted.*
2. Paravisini, L. and ***Peterson, D.G.*** 2016. Characterization of Browning Formation in Orange Juice during Storage. ACS Symposium Proceedings, Browned Flavors: Analysis, Formation, & Physiology. *Accepted.*
3. Kokkinidou, S. ***Peterson, D.G.*** 2016. Identification of compounds that contribute to trigeminal burn in aqueous ethanol solutions. Food Chem. 211: 757-762 http://www.sciencedirect.com/science/article/pii/S0308814616308068
4. Bin, Q. and ***Peterson, D.G.*** 2016. Identification of Bitter Compounds in Whole Wheat Bread Crumb. Food Chem. 203: 8–15, http://www.sciencedirect.com/science/article/pii/S0308814616301182
5. Yeo, L., Thompson, D. and ***Peterson, D.G.*** 2016. Inclusion Complexation of Flavor Compounds by Dispersed High-Amylose Maize Starch (HAMS) in an Aqueous Model System. Food Chem. *199*: 393–400. http://www.sciencedirect.com/science/article/pii/S0308814615303320
6. Yucel, U. and ***Peterson, D.G.*** 2015. Effect of Protein–Lipid–Salt Interactions on Sodium Availability in the Mouth and Consequent Perception of Saltiness: In Solutions. J. Agric. Food Chem., 63: 7487–7493.
   Impact Factor: 3.1 http://pubs.acs.org/doi/abs/10.1021/acs.jafc.5b02311
7. Yucel, U. and ***Peterson, D.G.*** 2015. Effect of Protein–Lipid–Salt Interactions on Sodium Availability in the Mouth and Consequent Perception of Saltiness: As Affected by Hydration in Powders. J. Agric. Food Chem., 63: 7494–7498. http://pubs.acs.org/doi/abs/10.1021/acs.jafc.5b02312

8. Forero, D.P, Orrego, C.E. **Peterson, D.G.** and *Osoria, C.* 2015. Chemical and sensory comparison of fresh and dried lulo (*Solanum quitoense* Lam.) fruit aroma. Food Chemistry, 169: 85–91. http://www.sciencedirect.com/science/article/pii/S0308814614011595
9. Kokkinidou, S. and ***Peterson, D.G.*** 2015. Characterization of compounds that influence alcohol trigeminal burn in spirits. Weurman Symposium Proceedings Flavour Science Proceedings of the XIV Weurman Flavour Research Symposium, Andrew Taylor and Donald Mottram (Eds), pg 31-37.
10. Ronningen, I. and ***Peterson, D.G.*** 2015. Application of untargeted LC/MS techniques (Flavoromics) to identify changes related to freshness of food, *in* The Chemical Sensory Informatics of Food: Measurement, Analysis, Integration. Eds. Guthrie, et al.; ACS Symposium Series; American Chemical Society: Washington, DC, Vol. 1191, pg 269-277. http://pubs.acs.org/doi/pdf/10.1021/bk-2015-1191.ch019
11. Zhang, L., Xia, Y. and ***Peterson, D.G.*** 2014. Identification of bitter modulating Maillard-catechin reaction products. J. Agric. Food Chem. 62, 10092−10100. http://pubs.acs.org/doi/abs/10.1021/jf502040e
12. Karametsi, K., Kokkinidou, S., Ronningen, I. and ***Peterson, D.G.*** 2014. Identification of Bitter Peptides in Aged Cheddar Cheese. J. Agric. Food Chem. 62, 8034−8041. http://pubs.acs.org/doi/abs/10.1021/jf5020654
13. Troise, A. D. Fiore, A. Colantuono, A. Kokkinidou, S., **Peterson, D.G.** and *Fogliano, V.* 2014. Effect of olive mill wastewater phenol compounds on reactive carbonyl species and Maillard reaction end-products in ultrahigh-temperature-treated milk. J. Agric. Food Chem. 62, 10092−10100. http://pubs.acs.org/doi/abs/10.1021/jf501919y
14. Kokkinidou, S. and ***Peterson, D.G.*** 2014. Control of Maillard-type Off-Flavor Development in Ultra High Temperature Processed Bovine Milk By Phenolic Chemistry. J. Agric. Food Chem. 62, 8023−8033. http://pubs.acs.org/doi/abs/10.1021/jf501919y
15. Lui, X., Jiang, D. and ***Peterson, D.G.*** 2014. Identification of Bitter Peptides in Whey Protein Hydrolysate. J. Agric. Food Chem. 62, 5719−5725. http://pubs.acs.org/doi/abs/10.1021/jf4019728
16. Kokkinidou, S. and ***Peterson, D.G.*** 2013. Response Surface Methodology as Optimization Strategy for Reduction of Reactive Carbonyl Species in Heat-processed Foods by Means of Phenolic Chemistry. Food and Function. 4(7): 1093-1104. http://pubs.rsc.org/en/content/articlelanding/2013/fo/c3fo60032g
17. Jiang, D. and ***Peterson, D.G.*** 2013. Identification of Bitter Compounds in Whole Wheat Bread. Food Chem. 141; 1345-1353. http://www.sciencedirect.com/science/article/pii/S0308814613003233
18. Moskowitz, M., Bing, Q., Elias, R. and ***Peterson, D.G.*** 2012. Influence of endogenous ferulic acid in whole wheat flour on bread crust aroma. J. Agric. Food Chem. 60: 11245-11252. http://pubs.acs.org/doi/abs/10.1021/jf303750y
19. Ferruzzi, M.G., **Peterson, D.G.**, Singh, R.P. Schwartz, S.J. and *Freedman, M.* 2012. Nutritional Translation Blended With Food Science: 21st Century Applications. Adv. Nutr. 3: 813–819. http://advances.nutrition.org/content/3/6/813
20. Bin, Q., Jiang, D. Cho, I.H., ***Peterson, D. G.*** 2012. Chemical markers for bitterness in wheat bread. 2012. Flavour Fragr. J. 27, 454–458. http://onlinelibrary.wiley.com/doi/10.1002/ffj.3124/abstract

21. **Peterson, D.G**. 2012. Refining Maillard-type flavor chemistry: Phenolic reaction pathways, *in* Advances and Challenges in Flavor Chemistry & Biology. Plenary Lecture, 9th Wartburg Symposium Proceedings on Flavor Chemistry & Biology, Eisenach, Germany, pp 155-160
22. Bin, Q. **Peterson, D.G.** and *Elias, R.J.* 2012. Influence of phenolic compounds on the mechanisms of pyrazinium radical generation in the Maillard reaction. J. Agric. Food Chem. *60* (21), pp 5482–5490. http://pubs.acs.org/doi/full/10.1021/jf3010838
23. Jiang, D. Huang, Y. and **Peterson, D.G**. 2012. Application of Two-Dimensional Orthogonal Reversed-Phase Liquid Chromatography for Taste Compound Analysis. In Recent Advances in the Analysis of Food and Flavors; Toth, S., et al.; ACS Symposium Series; American Chemical Society: Washington, DC. http://pubs.acs.org/doi/abs/10.1021/bk-2012-1098.ch010
24. Moskowitz, M. and **Peterson, D. G.** 2011. Hydroxycinnamic acid-Maillard reactions in simple aqueous model systems. *in* Controlling Maillard Pathways. Washington, D.C.: American Chemical Society Symposium Proceedings 1042, pp 53-62. http://pubs.acs.org/doi/abs/10.1021/bk-2010-1042.ch006
25. Holt, A., Potineni, R. and **Peterson, D.G.** 2011. Flavor ingredient interactions in confections. Accepted. 12th Weurman Symposium Proceedings, Interlaken, Switzerland. *Pg 139-142.* https://home.zhaw.ch/~vere/pdf/Teil37 - Expression of Multidisciplinary.pdf
26. Cho, I. H. and ***Peterson, D.G.*** Chemistry of bread aroma: A review. 2010. Food Sci. Biotechnol. 19, 575-582. http://link.springer.com/article/10.1007/s10068-010-0081-3
27. Jiang, D. and ***Peterson, D.G.*** 2010. Role of hydroxycinnamic acids on food flavor: a brief overview. Phytochem. Rev. 9:187–193 http://link.springer.com/article/10.1007/s11101-009-9159-z
28. Jiang, D. , Chiaro, C., Maddali, P, Prabhu, S.K. and ***Peterson, D.G.*** 2009. Identification of hydroxycinnamic acid-Maillard reaction products in low-moisture baking model systems. J. Agric. Food Chem. 57, 9932–9943. http://pubs.acs.org/doi/full/10.1021/jf900932h
29. Potineni, R.V. and ***Peterson, D.G.*** 2008. Mechanisms of flavor release in chewing gum: Cinnamaldehyde. J. Agric. Food Chem *56, 3260–3267.* http://pubs.acs.org/doi/full/10.1021/jf0727847
30. Potineni, R.V. and ***Peterson, D.G.*** 2008. Influence of flavor solvent on flavor release and perception in sugar-free chewing gum. J. Agric. Food Chem *56, 3254–3259.* http://pubs.acs.org/doi/full/10.1021/jf072783e
31. Tapanapunnitikul, O., Chaiseri, S., **Peterson, D**., *Thompson, D.* 2008. Water solubility of flavor compounds influences formation of flavor inclusion complexes from dispersed high-amylose maize starch. J. Agric. Food Chem *56, 220-226.* Impact Factor *3.1. http://pubs.acs.org/doi/full/10.1021/jf071619o*
32. Ghosh, S., **Peterson, D.G.**, *J.N. Coupland.* 2008. Temporal Aroma Release Profile of Solid and Liquid Droplet Emulsions. Food Biophysics. 3:335–343 http://pubs.acs.org/doi/full/10.1021/jf071619o
33. Jiang, D. and **Peterson, D.G.** 2008. Hydroxycinnamic acid-Maillard reactions: Insights into flavor development of whole grain foods. 12th Weurman Symposium Proceedings, Interlaken, Switzerland, pg 297-300. https://home.zhaw.ch/~vere/pdf/Teil76 - Expression of Multidisciplinary.pdf

34. **Peterson, D.G.** and Noda, Y. 2008. Role of Phenolic Reactions on Maillard Reaction Flavours. Wartburg Flavor Symposium. 8th Wartburg Symposium Proceedings on Flavor Chemistry & Biology, February 28 - March 2, 2007, Eisenach, Germany.
35. Vunta H, Davis F, Palempalli UD, Bhat D, Arner RJ, Thompson JT, **Peterson DG**, Reddy CC, *Prabhu KS*. 2007. The Anti-inflammatory Effects of Selenium Are Mediated through 15-Deoxy-Δ12,14-prostaglandin J2 in Macrophages. J. Biol. Chem. V. 282, No. 25, pp. 17964–17973. Impact Factor 4.651. http://www.jbc.org/content/282/25/17964
36. Ghosh, G., **Peterson, D.G.** and *Coupland, J.N.* 2007. Aroma Release from Solid Droplet Emulsions: Effect of Lipid Type. JAOCS. 84:1001–1014. http://link.springer.com/article/10.1007/s11746-007-1135-4
37. Noda, Y. and ***Peterson, D.G.*** 2007. Structure-reactivity relationships of flavan-3-ols on product generation in aqueous glucose/glycine model systems. J. Agric. Food Chem. 55. 3686-3691. http://pubs.acs.org/doi/full/10.1021/jf063423e
38. Totlani, V.M. and ***Peterson, D.G.*** 2007. Influence of Epicatechin Reactions on the Mechanisms of Maillard Product Formation in Low Moisture Model Systems. J. Ag. Fd. Chem. 55: 414-420. http://pubs.acs.org/doi/full/10.1021/jf0617521
39. Totlani, V.M. and ***Peterson, D.G.*** 2006. Epicatechin carbonyl-trapping reactions in aqueous Maillard systems: Identification and structural elucidation. J. Agric. Food Chem. 54: 7311-7318. http://pubs.acs.org/doi/full/10.1021/jf061244r
40. Schwambach, S.L. and ***Peterson, D.G.*** 2006. Reduction of stale flavor development in low-heat skim milk powder via epicatechin addition. J. Ag. Fd. Chem. 54: 502-508. *http://pubs.acs.org/doi/abs/10.1021/jf0519764*
41. Ghosh, G., **Peterson, D.G.** and *Coupland, J.N.* 2006. Effects of droplet crystallization and melting on the aroma release properties of a model oil-in-water emulsion. J. Ag. Fd. Chem. 54; 1829-1837. http://pubs.acs.org/doi/abs/10.1021/jf052262w
42. **Peterson, D.G.**, Colahan-Sederstrom, P.M. and Potineni, R.V. 2006. Effect of processing technology and phenolic chemistry on ultra-high temperature Bovine milk flavor quality. *in* Chemistry and Flavor of Dairy Products, Symposium Proceedings, 228th ACS National Meeting, Philadelphia, PA, August 22-26, 2004. http://pubs.acs.org/doi/abs/10.1021/jf0487248
43. Dubost, N.J., *Beelman, R.B.*, **Peterson, D.G.,** and Royse, D.J. 2006. Identification and quantification of ergothioneine in cultivated mushrooms by liquid chromatography-mass spectroscopy. Int. J. Med. Mushr. 8:215-222. http://www.dl.begellhouse.com/journals/708ae68d64b17c52,67fa6af2515135b9,62e00b0414f6d4ec.html
44. Totlani, V.M. and ***Peterson, D.G.*** 2005. Reactivity of epicatechin in aqueous glycine and glucose Maillard reaction models: quenching of C_2, C_3 and C_4-sugar fragments. J. Ag. Fd. Chem. 53: 4130-4135. Impact Factor 3.1. http://pubs.acs.org/doi/full/10.1021/jf050044x
45. Colahan-Sederstrom, P.M. and ***Peterson, D.G.*** 2005. Inhibition of key aroma compound generated during ultra-high temperature processing of bovine milk via epicatechin addition. J. Ag. Fd. Chem. 53: 389-402. http://pubs.acs.org/doi/full/10.1021/jf0487248
46. Potineni, R.V. and ***Peterson, D.G.*** 2005. Influence of thermal processing conditions on flavor stability in fluid milk: benzaldehyde. J. Dairy Sci. 88:1-6.

http://www.sciencedirect.com/science/article/pii/S0022030205726552

47. Morawicki, R.O., *Beelman, R.B.*, **Peterson, D.G**. 2005. Recovery and purification of 10-oxo-*trans*-8-decenoic acid enzymatically produced using a crude homogenate of *Agaricus bisporus*. J. Food Sci. 70(8): C490-494.
Impact factor: 1.775. http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2621.2005.tb11506.x/abstract
48. Morawicki, R.O., *Beelman, R.B.*, **Peterson, D.G.** and Demirci, A. 2005. Biosynthesis of 1-octen-3-ol and 10-oxo-trans-8-decenoic acid using a crude homogenate of Agaricus bisporus: Reaction Scale Up. J. Food Sci. 70(5):367-371.
http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2621.2005.tb09978.x/abstract
49. Gallaher, J.J, **Peterson, D.G.**, Roberts, R.F. and *Coupland, J.N.* 2005. Effect of composition and antioxidants on the oxidative stability of fluid milk supplemented with an omega-3 oil rich emulsion. International Dairy Journal. 15: 333-341.
http://www.sciencedirect.com/science/article/pii/S095869460400216X
50. Morawicki, R.O., *Beelman, R.B.*, **Peterson, D.G**. and Ziegler, G. 2005. Biosynthesis of 1-octen-3-ol and 10-oxo-trans-8-decenoic acid using a mushroom homogenate. Optimization of the reaction, part I: kinetic factors. Process Biochemistry. 40:131-137.
http://www.sciencedirect.com/science/article/pii/S0032959203004618
51. **Peterson, D.G.** and V.A. Totlani. 2005. Influence of flavonoids on the thermal generation of aroma compounds. in Phenolics in Foods and Natural Health Products, New York, ACS Symposium Series #909, September 7-11, 2003, pg 143-160.
http://pubs.acs.org/doi/abs/10.1021/bk-2005-0909.ch013
52. Schober, A.L. and ***Peterson, D.G.*** 2004. Flavor release and perception in hard candy: Influence of flavor compound-compound interactions. J. Ag. Fd. Chem. 52: 2623-2627.
http://pubs.acs.org/doi/full/10.1021/jf0353133
53. Schober, A.L. and ***Peterson, D.G.*** 2004. Flavor release and perception in hard candy: Influence of flavor compound-flavor solvent interactions. J. Ag. Fd. Chem. 52: 2628-2631.
http://pubs.acs.org/doi/full/10.1021/jf0354287
54. Nattress, L.A , *Ziegler, G.R.*, Hollender, R and **D.G. Peterson**. 2003. The impact of hazelnut paste on the sensory properties and shelf life of dark chocolate. J. Sensory Studies. 19: 133-148. Impact factor 3.1. http://onlinelibrary.wiley.com/doi/10.1111/j.1745-459X.2004.tb00141.x/abstract
55. **Peterson, D.G**. and *Reineccius, G.A.* 2003. Characterization of the volatile compounds which constitute fresh sweet cream butter aroma. Flavour Frag. J. 18(3):215-220.
http://onlinelibrary.wiley.com/doi/10.1002/ffj.1192/abstract
56. **Peterson, D.G.** and *Reineccius, G.A.* 2002. Biological pathways for the formation of oxygen-containing aroma compounds. in Heteroatomic Aroma Compounds. G.A. Reineccius. ACS Symposium 826, pg. 227-242. http://pubs.acs.org/doi/abs/10.1021/bk-2002-0826.ch014
57. **Peterson, D.G.** and *Reineccius, G.A.* 2002. Determination of the aroma impact compounds in heated sweet cream butter. Flavour Frag. J. 18(4):320-324.
http://onlinelibrary.wiley.com/doi/10.1002/ffj.1228/abstract
58. **Peterson, D.G.** and *Fulcher, R.G.* 2001. Variation in Minnesota HRS wheats: Starch granule size distribution. Food Research International 34(4): 357-363.
http://www.sciencedirect.com/science/article/pii/S0963996900001757
59. **Peterson, D.G.** and *Fulcher, R.G.* 2001. A simple digital conversion of a traditional laboratory mixograph. Cereal Research Communications 29(3-4): 397-404.

60. **Peterson, D.G.** and *Fulcher, R.G.* 2001. Variation in Minnesota HRS wheats: Bran content. J. Food Sci. 67(1): 67-70. http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2621.2002.tb11360.x/abstract

Patents (inventor):
International Application (PCT). April 21st, 2015. Peterson, D. and Kokkinidou, S. Methods of Making Modified Alcohol Containing Products.

USA application. An umami-enhanced food product and method of enhancing the umami taste of food products.

Courses Taught:
Flavor Chemistry (FScN 8337), Flavor Technology (FScN 5521); Current Issues in Food Science (FScN 8318); Food Chemistry and Functional Foods (FScN 4112)

Professional Memberships:
American Chemical Society
Institute of Food Technologists

EXHIBIT B

MATERIALS CONSIDERED

- U.S. Application Serial No. 14/797,006, Fraser, R. Brown, P.O., Karr, J. and Holz-Schietinger, C., 2014, Publication No. US 2015/0351435
- Hsieh, F-h and Huff, H.E. 2012. Meat analog compositions and process. U.S. Patent Application No. US 2012/0093994 ("the '994 application")
- Office Action Mailed June 6, 2016 and draft Response to same
- Declaration Under 37 CFR §1.132 of Celeste Holz-Schietinger, Ph.D.
- Calkins, C.R. and Hodgen, J.M. A fresh look at meat flavor. Meat Sci. 2007, 63-80.
- Proulx, A.K. and Reddy, M.B. Iron bioavailability of hemoglobin from soy root nodules using caco-2 cell culture model. J. Agric. Food Chem. 2006, 54, 1518-1522.
- Belitz, H.-D., Grosch, W., and Schieberle, P. Food Chemistry, 3rd revised edition. Springer-Verlag, Berlin (2006), p. 368.
- Tang, W., Jiang, D., Yuan, P. and Ho, C.-T. (2013) Flavor chemistry of 2-methyl-3-furanthiol, an intense meaty aroma compound. J. Sulfur Chem. 34: 38-47.
- Chaudhari, N. and Roper, S.D. (2010). The cell biology of taste. J. Cell Biol. 190(3): 285-296.
- Shahidi, F., Rubin, L.J., D'Souza, L.A., Teranishi, R. and Buttery, R.G. 1986. Meat flavor volatiles: A review of the composition, techniques of analysis, and sensory evaluation. CRC Crit. Rev. Food Sci. Nutr. 24: 142-243.
- Cadwallader, K.R. and MacLeod, A.J. 1998. Instrumental methods for analyzing the flavor of muscle foods. Ch. 16. In *Flavor of Meat, Meat Products, and Seafoods, 2nd Ed.* Shahidi, F. (Ed.). Blackie Academic & Professional, New York, pp.
- Jublot, L., Rosing, E.A.E, Blom, L. v.d., Desclaux, G., Martins, S.I.F.S., Batenburg, A.M.

and Smit, G. 2010. Quantitation of sulphur aroma compounds in Maillard model reaction systems of different composition. In *Expression of Multidisciplinary Flavour Science.* Proceedings of the 12th Weurman Symposium. Blank, I., Wüst, M., and Yeretzian, C. (Eds.). Winterthur: Zurich University of Applied Sciences.

- Spence, C. 2015. Multisensory flavor perception. Cell 161: 24-35.