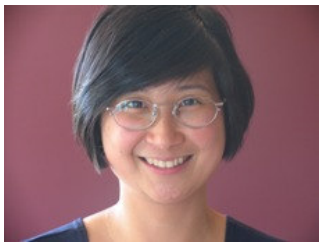
Winners of 2006 George F. Stewart IFT International Research Paper Competition

First Place ($700.00 + certificate)



Indrawati Oey

Vitamin stability under high pressure processing: a case study on folate

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Folates (vitamin B family) play an important role in the metabolism of amino and nucleic acids. An inadequate folate intake can cause several disorders, cancers and diseases. Evidences have shown that non-thermal processing/preservation (e.g. high pressure/HP) applied to (plant based) foods have an influence on folate stability; however HP is claimed having no/limited effects on covalent bonds. The research objective was to study the mechanisms and kinetics of vitamin (particularly folates) stability during HP. The study was extended to intact vegetables for validation.

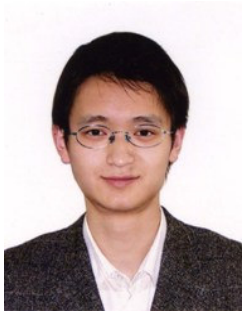
To generate basic insight in the mechanisms and kinetics, 5-methyltetrahydrofolate (5MTHF, m/z 460) was diluted in buffer solutions. Temperature and/or HP treatments were carried out in a multivessel pressure apparatus (100-700Mpa; 10-60°C) for different time intervals. Folate concentrations were quantified by RP-HPLC/UV/fluorescence. Degradation products were identified by RP/HPLC/MS-MS(ESI+). For validation, folate stability in vegetables was studied. Extraction and purification were conducted prior to folate quantification. The water-soluble-antioxidant-capacity was estimated as TEAC and vitamin C content was quantified by RP/HPLC.

HPLC/MS-MS data showed that folate pressure degradation was primarily caused by oxidation (formation of 6-hydroxy-5-methyl-5,6-dihydrofolate, m/z 474) and the oxidation mechanism could be depicted. In the pressure/temperature/time combinations studied, the oxidation products could be completely reduced by antioxidant. Based on kinetic data, it was clear that the oxidation rate was accelerated by increasing pressure and temperature, and decelerated by adding antioxidant. Temperature of folate oxidation at 0.1Mpa was shifted to lower temperatures when applying pressure (>50Mpa) (because of negative activation volume). The validation study showed that folate degradation in vegetables under HP was limited due to the existence of endogenous ascorbic acid.

Based on these results, the vitamin stability might be affected during HP because undesired chemical reactions can be enhanced. Consequently, nutrient stability must be highly considered when HP is combined with elevated temperatures (e.g. HP sterilization).

Keywords: antioxidant, folate, stability, high pressure, temperature

Second Place ($500.00 + certificate)



Yu Zhang

Addition of Antioxidant of Bamboo Leaves (AOB), an Effective Way to Reduce Acrylamide Formation in Potato Chips and Potato Crisps

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The present study was to demonstrate the efficiency of antioxidant of bamboo leaves (AOB) on the reduction of acrylamide during thermal processing and summarize the optimal level of AOB applied in selected food matrixes. Potato chips and crisps were immersed into different levels of AOB solution and the frying processing parameters were optimized. The acrylamide level was determined by LC-MS/MS. The sensory evaluation was performed in double blind manner. Our results showed that nearly 74.1% and 76.1% of acrylamide in potato chips and crisps were reduced when the AOB addition ratio was 0.1% and 0.01% (w/w), respectively. The maximum inhibitory rate was achieved when the immersion time was designed as 1 min. Sensory evaluation results showed that the flavor and texture of potato chips and crisps processed by AOB solution had no significant difference compared to normal food matrixes (P>0.05) when the AOB addition ratio was <0.5% (w/w). These results suggested that AOB could significantly reduce acrylamide formation in potato based foods and keep original flavor and texture of food matrixes. This study could be regarded as a pioneer contribution on the reduction of acrylamide in various foods by natural antioxidants.

Keywords: acrylamide; potato chips; potato crisps; reduction; antioxidant of bamboo leaves

Third Place ($200.00 + certificate)

R. M. Zhong

Composition Identification and Biological Activity of the Essential Oils from the Main Medicinal Segments of *Myrica rubra* Tree

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Essential oils hydrodistilled from root and leaf of *M. rubra* var. *astropurea* Tsen were comparatively investigated for their chemical composition, antioxidant and antimicrobial activities and main active components. Gas chromatography-mass spectroscopy (GC-MS) for the compound identification was used. Antioxidant activity was evaluated with three *in vitro* assays: 2,2′-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging, β-carotene bleaching (BCB) and thiobarbituric acid reactive species (TBARS). Antimicrobial activity for the essential oils against 7 food borne pathogens and 2 fungi was carried out by microdilution agar plate method. Main active components of the essential oils were discriminated by TLC-screening and bioautography methods. Principal components of the root oil were 5-hydroxycalamenene (74.66 %) and phytol (7.74%), and those of the leaf oil were 5-hydroxycalamenene (30.44%), caryophyllene (11.61%), isocaryophyllene (10.17%), and (E)-nerolidol (9.57 %), respectively. Antioxidant effect of the root essential oil was comparable to butylated hydroxytoluene (BHT), and much better than that of the leaf oil. Moreover, root essential oil was particularly effective against *Bacillus cereus* and *Listeria monocytogenes* with minimal inhibition concentration (MIC) ≤0.004% and 0.03%(v/v), respectively. The strength of inhibition for the root oil often exceeded those determined in the leaf oil. Interestingly, the antioxidant and antimicrobial activities of the root oil apparently were mainly correlated with its 5-hydroxycalamenene content. Given that this product has high biological activity and safety in usage, it might possess food preservative potentials.

Keywords: essential oil, *Myrica rubra*, 5-hydroxycalamenene, antioxidant activity, antimicrobial activity

The two other finalists were:

1. Mr. Song Ji

Title: Novel Food Ingredient Derived from Casein/k-Carrageenan Interactions, S. Ji, H.D. Goff*, M. Corredig,
Department of Food Science, University of Guelph, Canada
Prize: a certificate

2. Ms. Sandy Van Buggenhout

Title: Minimizing texture loss of frozen fruits and vegetables: Effect of enzymatic pectin modifications combined with high-pressure shift freezing. S. VAN BUGGENHOUT, V. Maes, T. Duvetter, A. Van Loey, M. Hendrickx;
Catholic University Leuven, Leuven, Belgium
Prize: a certificate

In addition, a free 1-year membership to the International Division is offered to all five finalists.