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1. Accession 0223160	Agency Identification No. 2. NIFA 3. LA.B	5. Work Unit/Project No. **LAB94052**	6. Status **Annual Report**

7. Title

Engineering for food safety and quality

12. Investigator Name(s) (Last Name and Initials)

Sabliov, C. M.

20. Termination Date 09/30/2015	40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011

Outputs:

The results of this work have been presented at seven conferences and in four publications.

Outcomes/Impacts:

A numerical model simulated temperature profiles in Newtonian as well as non-Newtonian fluids during continuous flow microwave heating by iterative coupling of electromagnetism, fluid flow and heat transport in COMSOL Multiphysics. The model was validated by using extensive experimental data for carboxymethyl cellulose solution and tap water at two different flow rates (1 and 2 lit/m) through a 915 MHz continuous flow microwave system at 4 kW of power. The model simulated microwave extraction of soybean and rice bran oil. The main benefit of using nanoparticles for the delivery of antifungals was to control the release of the antifungal drug near the cell surface or in the cytosol as a result of direct cellular uptake of nanoparticles. The antifungal itraconazole (ITZ) and coumarin-6 were loaded in PLGA (polylactic-co-glycolic acid) nanoparticles (PLGA-ITZ and PLGA-C6 NPs) and were tested for fungal cell uptake and antifungal ability based on particle size. PLGA-C6 nanoparticles of 203 nm were associated with fungal cell surfaces and internalized efficiently, while 1206 nm NPs associated with cell surfaces, but were internalized less efficiently. The PLGA-ITZ nanoparticle system increased bioavailability of ITZ by improving its aqueous dispersibility and efficiently delivering ITZ to fungal cells via endocytosis. The methodology developed in this project can be applied to develop antibacterial nanoparticles with entrapped natural and synthetic antimicrobials, for protection against food-borne bacteria and of tremendous interest to the food industry.

Publications:

Patel, N., K, Damann, C. Leonardi, and C. M. Sabliov. 2011. Size effect on uptake of Itraconazole Loaded Poly(lactic-co-glycolic) Acid Nanoparticles and associated improved antifungal activity. Nanomedicine, Vol. 6.(8):1381-1395, DOI 10.2217/nnm.11.35.

Kanitkar, A., C.M. Sabliov, S. Balasubramanian, M. Lima and D. Boldor. 2011. Microwave-Assisted Extraction of Soybeans and Rice Bran Oil: Yield and Extraction Kinetics. Transactions ASABE. Vol. 54:1387-1394.

Salvi, D., D. Boldor, G.M. Aita, and C.M. Sabliov. 2011. COMSOL Multiphysics Model for Continuous Flow Microwave Heating of Liquids. J. Food Engineering. 104(3): 422-429.

Terigar, B.G., C.M. Sabliov, S. Balasubramanian, M. Lima and D. Boldor 2011. Soybean and rice bran oil extraction in a continuous microwave system: from laboratory- to pilot-scale. J. Food Engineering 104: 208-217.

Participants:

C. Sabliov, (PI), D. Salvi, A. Kanitkar, N. Patel, B. Terigar, D. Bolder, C. Leonardi, S. Balasubramanian, M. Lima, and K. Damann, LSU AgCenter.

Target Audiences:

Academia, food and pharmaceutical industry.

Nothing significant to report during this reporting period.

Approved (Signature)	Title	Date
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