Complex Biosystems Seminar Series

Date: November 7, 2024, Time: 4-5pm Place: Beadle N176

Zoom: https://unl.zoom.us/j/99493999289

"Oil migration of fat crystalline networks"

Fats and oils are important ingredients in many foods since they are a source of energy, provide nutritional properties to foods, and can deliver fat-soluble vitamins. The difference between fats and oils is that fats are semisolid at room temperature, while oils are liquid. The use of fats and oils in various food applications depends on the final properties of the product. Liquid oils are usually employed in products such as salad dressings or frying applications where the oil does not provide any structure to the product. However, in other products such as margarines, butter, or chocolate, to name a few fats play an important role in providing texture and semisolid characteristics to the product.

The semisolid nature of fats is a direct result of their crystalline structure. That is, to become semisolid in nature, triacylglycerol molecules in fats must arrange themselves to form a crystalline network. This crystalline network will entrap liquid oil to some degree. The capability of a fat crystalline network to entrap oil is referred to as "oil binding capacity" and the "leakage" of oil out of the crystalline network is called "oil migration". This process of oil migration has become an important quality concern for fat-rich foods, especially when a healthy fat is used since, in general, they have weaker crystalline networks with lower oil binding capacities.

It is known that the oil binding capacity of a fat system is affected by their physical properties, but the exact role is still unknown. In this presentation we will describe the role that physical properties of various fats play on oil migration in semisolid fats and we will try to predict what physical properties are needed to increase oil binding capacity and therefore decrease oil migration.

Dr. Silvana Martini is a Professor Department of Food Science at the University of Nebraska-Lincoln. She obtained a BSc in Biochemistry and a PhD in Chemistry from the University of La Plata, Buenos Aires, Argentina. She was a Postdoctoral Researcher in the Department of Food Science at the University of Guelph, Canada, before joining Utah State University (2005). In 2018 Dr. Martini was appointed as director of the Aggie Chocolate Factory at Utah State University and in 2024 she was appointed as Department Head of the Food Science and Technology Department at the University of Nebraska-Lincoln.

Dr. Martini is a pioneer in the use of high-intensity ultrasound to change the physical properties of fats. Over the years Dr. Martini published more than 130 papers in peer-reviewed journals, participated in more than 200 conferences, was an invited speaker at more than 30 international conferences, and published 11 book chapters. Dr. Martini trained several undergraduate researchers, PhD, and MS students and received various international scholars in her lab. Dr. Martini received several local and international awards such as the Young Scientist Award from the Agricultural and Food Chemistry Division of the American Chemical Society and the Robins Award for Faculty Research of the Year for Utah State University, the Timothy L. Mounts Award, the 2024 Alton E. Bailey Award from the American Oil Chemists' Society and Fellow Award from the American Oil Chemists' Society. Dr. Martini serves as Editor-in-Chief for the Journal of the American Oil Chemists' Society and is the past President of the American Oil Chemists' Society.