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Particle formation using supercritical fluid technology to enhance the quality and health benefits of lipophilic bioactive compounds

Ozan N Ciftci

University of Nebraska-Lincoln, USA

The potential health benefits of many lipophilic (water-insoluble) bioactives with disease-fighting potential are not fully realized due to their low bioavailability, which is caused by their poor water solubility. Despite limited efficiency up to this point, lipophilic dietary bioactives hold great potential to combat disease, as the increased prevalence of diet-related illnesses (e.g., gastrointestinal health problems, inflammation, and obesity) and the growing demand for natural foods have negatively impacted the acceptability of foods containing artificial ingredients. Moreover, many of the lipophilic bioactives are chemically unstable; means they degrade during processing and storage and affects food quality negatively. Therefore, there is a critical need for the development of technology-driven foods that will enhance the quality and health benefits of the lipophilic bioactives. This presentation will demonstrate our innovative approaches based on supercritical fluid technology to form micro- and nanoparticles to deliver bioactive lipids and lipophilic bioactive compounds, and to improve their health benefits by improving their bioavailability. Case studies on development of hollow solid lipid micro- and nanoparticles to deliver fish oil and essential oils, and formation of low-crystallinity phytosterol nanoparticles using nano porous starch aerogels will be presented. These innovative approaches have the potential bolster the agro-industry by transferring this green technology to food manufacturers and by maximizing the use of bioactive compounds derived from agricultural products. They will also improve nutrition and health by addressing the chief limitation that poor bioavailability of many lipophilic bioactive compounds.

Biography

Ozan N Ciftci is an Assistant Professor in the Department of Food Science and Technology at the University of Nebraska-Lincoln, United States. Research in his Lab is focused on developing novel green approaches to enhancing the health benefits and quality of the food lipids. To achieve this, he is using approaches based on nanoscale science and engineering, and supercritical fluid technology. He is also interested in the fundamentals associated with the novel process development. More specifically, research in his lab is focused on two key areas: lipid particle formation and green extraction of bioactive lipids.

ciftci@unl.edu

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