Nanopatterning with Low Temperature Process for the Production of Instant Foaming Soluble Coffee

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Project Objectives

- Development of methodology for the stabilization of microbubbles in foamed coffee extract by the self-assembly based nanopatterning technique.
- Development of spray-freeze-drying process for the drying of foamed coffee extract.
- Characterization of nanopatterned microbubbles in the foamed coffee extract and the aroma profile of the dried soluble coffee powder.

Description

Surface tension analysis of coffee oil showed similar trend as commercial surfactant; with increase in concentration, there is lowering in surface tension, which indicates the presence of surface active component in coffee oil. For the first time, determination of surface active component was done using H-NMR analysis of coffee oil. This showed the presence of n-hexane in the lipophilic region. Chlorogenic acid in the hydrophilic region which is the ester of quinic acid based on this addition of coffee oil in coffee extract showed some molecular assembly, in which hydrocarbon chain acts as a hydrophobic tail while Chlorogenic acid acts as a hydrophilic head. The effect of coffee oil on foam characteristics, coalescence rate, bubble count and stability of microbubbles were studied. From the surface tension analysis the critical micelle concentration of coffee oil is calculated and it found as 0.03%; with this concentration it is showing superior characteristics in terms of foaming parameters and bubble characteristic compare to other surfactant. So to prove coffee oil as a surfactant HLB value is calculated by various methods and it is found in between 10-11, which shows that coffee oil can acts as an oil-in-water emulsifier. TEM analysis of coffee extract containing coffee oil shows the formation of pattern on the surface of the coffee bubble. From the present observation SFD of coffee extract with coffee oil as surfactant followed by gasification and nanopatterning may help to form stable foam for a longer period.