Morphology and dissolution of cranberry juice during single droplet drying

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American Cranberry (*Vaccinium macrocarpon* Ait.) is a rich source of phenolic compounds, which are linked with various health benefits. Spray-drying is a most widely applied technique for manufacturing fruit powder, due to the efficiency, low cost and short residue time. Cranberry juice has successfully been spray-dried earlier to study the physicochemical changes during processing. However, drying mechanisms and behaviours are still unclear.

In this study, single droplet drying approach was employed on cranberry juice, which simulated the corresponding spray-drying conditions. [1] Cranberry juice was encapsulated with 4 different wall materials (Maltodextrin (MD) with different DE, and Gum Acacia (GA)). Droplets of 2μL feeding solutions were suspended on a glass filament above hot air flow, and the surface formation phenomena was monitored by camera. The dissolution test was conducted to investigate the wetting behaviours of the semi-dry or dry particles, by attaching a 2μL water droplet to particles at various drying stages. The drying and rehydration behaviours were observed and compared among different wall materials at varied drying stages. The microstructures of the particles were investigated by scanning electron microscopy (SEM). The results indicated the drying mechanisms of cranberry juice with various wall materials.

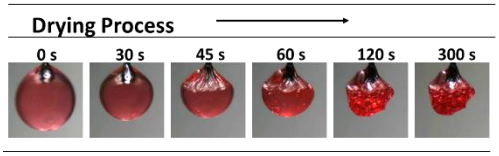

Figure 1. Drying Process for cranberry juice encapsulated with GA

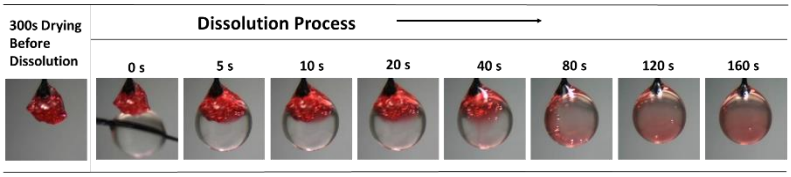

Figure 2. Dissolution Process for GA encapsulated cranberry juice particle

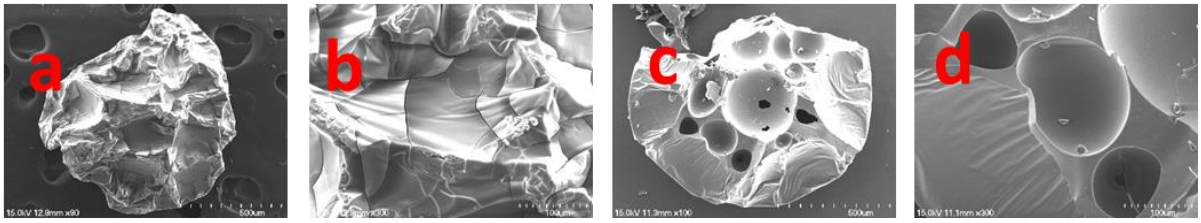

Figure 3. SEM images of dried cranberry particle encapsulated with GA.
(a) Surface (90×) (b) Surface (300×) (c) Cross section (100×) (d) Cross section (300×)

1. Lin, S.X. Q.; Chen, X.D. *Improving the glass-filament method for accurate measurement of drying kinetics of liquid droplets;* Chem. Eng. Res. Des. 80 (4). 401-410, 2002.