**Encapsulation of Daidzein by Complex Coacervation of Casein and Arabic Gum**

**Fatemeh-Sadat Mousavi, Abdol-Khalegh Bordbar, Abolghasem Abbasi Kajani**

Department of Chemistry, University of Isfahan, Isfahan, 81746-73441, Iran

**ABSTRACT**: The application of food additives especially antioxidant compounds in food industry has increased recently to improve the quality of products. In this context, the protection of antioxidants during food processing and storage is very vital due to their instability. Encapsulation not only enhances the storage stability of compounds but also increases their *in vivo* accessibility via their gradual delivery during digestion. In the present study, we report the encapsulation of daidzein (DZ), as one of the most important antioxidants, by complex coacervation of casein (CA) and Arabic gum (AG), as two biodegradable and natural polymers. To this aim, the best condition for complex coacervation of casein/Arabic gum was first investigated using different concentrations and mixing ratios of biopolymers as well as various pH values. Based on the results, the highest stability and production yield of coacervate obtained at a 2:1 ratio of casein/Arabic gum with an optimum pH of 4.8. DLS and zeta potential measurements of the sample showed the formation of stable colloidal nanocapsules with an average hydrodynamic diameter of 110.8 nm and zeta potential of -37.1. The efficiency of coacervates for the entrapment of daidzein was studied using UV-Vis and fluorescence spectroscopy. The results indicated that more than 60 % of the antioxidant was encapsulated by the coacervates. The freeze-dried coacervates displayed effective and controlled release of daidzein (up to 81%) over 72 h. The overall results indicated the high potential of complex coacervation of casein and Arabic gum for encapsulation and controlled release of daidzein.

Keywords: complex coacervation, daidzein, casein, Arabic gum