Abstract

Fairy Shrimp (*Branchinecta thailandensis*) protein (FSP) is a novel myofibrillar protein source that has a promising potential in functional and nutritional for food applications. However, low solubility and aggregation due to its aqueous environment, lead to limitations on its emulsifying and foaming capabilities. The aim of this research is to evaluate the effect of high pressure processing (HPP) or pulsed electric field (PEF) on the functional properties and secondary structure of fairy shrimp protein. Fairy shrimp protein was treated with various combinations of HPP (200, 400, and 600 MPa with 10, 15, and 20 minutes) and PEF (5 and 10 kV/cm with 3000, 6000, and 9000 pulses). Results showed that HPP at 400 MPa for 10 minutes and PEF 5kV/cm with 9000 pulses significantly enhanced foaming activity up to 70% compared to control 56.7%. Foam stability also improved in the same condition, showing better retention and collapse in higher intensity. Emulsion activity remained constant at 100% across all treatments, while emulsion stability increased slightly under moderate conditions. FTIR analysis revealed that both of the treatments increased β-sheet and α-helix content and decreased trend on β-turn and random coil structures, that means partial protein unfolding and improvement on interfacial behavior. This research highlights that moderate HPP and PEF treatments can effectively enhance the functional and structural properties of FSP, which would contribute to its application in sustainable and innovative food ingredients or supplements.

Keywords : *Fairy shrimp protein, functional properties, high pressure processing, protein structure, pulsed electric field*