

Novel preparation of Betalain extract from waste for intelligent packaging film application

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Abstract

Natural colour from plant source is being investigated for multifarious ecofriendly sustainable food applications. Among many steps, the pigment extraction is one of the most important steps. Beside conventional extraction methods like Soxhlet extraction, maceration and hydro distillation etc., non-conventional methods like supercritical fluid extraction, pressurized liquid extraction, microwave assisted extraction, ultrasound assisted extraction, pulsed electric field extraction and enzyme assisted extraction are gaining popularity due to the advantages friendliness. Prior to the extraction steps, pretreatment of beetroot waste for stabilization of natural pigments is another important step which must be carefully taken care of. Our aim is to get the maximum yield of betalains from beetroots waste by using green solvents to avoid the harmful effect of organic solvents, as well as to increase the stability of extracted pigments in the microencapsulated forms for application in food formulations and food packaging. Enzymatic mix employed consisted of cellulose, xylanase and pectinase. The enzyme assisted green extraction was coupled with use of Deep Eutectic Solvents, that included magnesium chloride hexahydrate [MgCl₂, 6H₂O] and urea [U] proportions (1:1) and (2:1). They performed as extracting and stabilizing agents for red and violet betalains from beetroots. Prepared DES [MgCl₂, 6H₂O], [U] showed similar properties to eutectic mixtures, such as liquid phase, low melting point and conductivity, thermal stability and variable viscosity. Betalain stability was determined by degradation test. Optimization of pH, temperature and time has also been conducted to increase the productivity and stability of extracted betalains. Microencapsulation is done by freeze drying of mixtures consisting of pigment, maltodextrin + gum Arabic (MD+GA), maltodextrin + carboxymethyl cellulose (MD+CMC), maltodextrin + carrageenan (MD+C), and maltodextrin (MD) with ration 3:1 and 4:1 (w/v) to the extract. MD+GA coating material indicated highest value of encapsulation efficiency. Betalain sensitivity to pH change is being investigated for development of intelligent packaging film to detect the deterioration of protein rich food products like fish etc.

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Biography

Bijita Ghatak is a Food Technology graduate (B. Tech.) from Techno India, Salt Lake, Kolkata in 2009. Subsequently she has worked in various food and dairy industries and testing laboratories in West Bengal (India) in various capacities.

Currently she is in the final semester of her master's degree in Food Technology (M. Tech.) from Techno Main Salt Lake. This poster represents her work on her final year project for her master's degree.