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The research process in the aqueous enzymatic extraction of vegetable oil and protein

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Edible vegetable oil is an essential consumption goods in people's daily life, and edible oil production industrial closely related to national economy and people's livelihood, acting an important role in protecting the food security and providing a variety of essential industrial raw materials. Although the oil extraction rate is above 95% for the conventional extraction method, the protein is largely denatured during oil extraction and cannot be applied in the production of foods and feed. In addition, although the current "pre-pressing and extraction" method has a high oil extraction rate, however, there still exists some technical bottlenecks: (1) the complex impurities in raw oil, which needs refining process to remove them, resulting in the loss of flavor; (2) the high temperature during press and exsolution process leading to the damage of severe essential amino acids in soy protein, lowering protein's utilization; (3) the usage of organic solvent, such as hexane, resulting in the increase of volatile organic compounds in the atmosphere, and react with other pollutants generating ozone and harmful photochemical oxidants. Therefore, the development of green, safe, nutritional, healthy, environment-friendly, and high efficient oil technology is imperative. Such that, the aqueous enzymatic extraction of vegetable oil and protein is came into being.

Recently, the breakthrough technologies of the aqueous enzymatic extraction including: (1) the components, molecular structure and distribution of subcellular oil bodies, elaborating the interacting model between soybean components and soybean oil body micro particles; (2) evaluation of the effect of mechanical energy input on the soybean oil release and aggregation; (3) investigation of the structure-activity relationships between the changes of protein's molecular structure and oil; (4) develop molecular dynamics models between the change of key components in soybean and oil release rate; (5) analysis of the chemical composition of the emulsion phase, interfacial properties and molecular modes of action, and emulsion stable mechanism; (6) analysis of the emulsion breaking process with ultra-morphology, interfacial properties and intermolecular forces, molecular sorting and spatial conformational changes, to clarify the breaking mechanism;(7) study of the key technologies in the aqueous enzymatic extraction; (8) retaining the flavor and quality of soybean milk fortified by hydrolyzed protein (polypeptide); (9) develop utilization technologies of the by-products from aqueous enzymatic extraction of soybean oil. The aforementioned studies will provide theoretical base and technical supports for the bio-processing and regulation of producing high-value soybean products and high-end soybean products, and enhance China's soybean integrated processing technology, which has important theoretical and practical significance in realizing the soybean utilization.