554b In Integrated Approach to Evaluate and Model Engineeering Properties of Biomaterials

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The need to determine properties of foods/bio-materials has been a recurring theme both in industry and research circles as a tool for competitiveness and innovation. To successfully compete in the global marketplace and respond to the increased emphasis on food safety and rapid growth of new emerging markets such as nutraceuticals and functional foods, industries require a better understanding of food material properties. There have been some efforts to develop methods for the measurement and prediction of some properties as they relate to various scientific fields of expertise i.e., physical properties such as predictive models (European COST projects), general properties of agricultural products (USDA). More recently, some attempts have been made towards the evaluation of functional properties. However, most of these approaches are used to measure and predict average properties of these materials, usually based on average concentrations of the main elements. This data in itself is the foundation on which we need to build the actual properties of the real food material in all of its complexity. However, extending this calculated property to the whole food without taking into account the existence of different regions (phases) with different composition and structure will negate the benefit inherent in the initial calculation. In order to reflect the structure effect, a different approach needs to be put in place. More recently, a very fundamental approach based on the molecular level has been emerging. In the long run, it will be the one on which one can rely to elucidate many of the biological properties of foods. However, from an engineering point of view there is a need for an approach which is neither the molecular nor the macroscopic average currently being used. The proposed methodology is based on the reassessment of the current evaluation of food properties. Not only does the food composition need to be assessed, but the location of these compounds in various phases and the effect of the structure on properties needs to be taken into account. In this paper, the methodology to evaluate and model engineering properties of food/biomaterials consisting of multi-phase and multi-component heterogeneous systems, will be presented. It is intended that validation of the model will be undertaken for a typical bakery product application.