Preface

The purpose of this Volume, entitled “Advanced Topics in Transport Processes: From Drying and Osmotic Dehydration to Freezing”, is to provide a collection of recent trends, developments, and applications in the field of transport processes and food preservation, namely the technologies of osmotic dehydration, vacuum drying, freeze drying, superheated steam drying, heat pump drying and spray drying.

The development of food preservation in the course of centuries meant a constant struggle with available products and a better understanding of the mechanisms of preservation. Food is dried to enhance storage stability, minimize packaging requirement and reduce transport weight. Food preservation through drying based on sun and solar drying techniques which cause poor quality and product contamination. An optimum drying system for the preparation of quality dehydrated products is cost effective as it shortens the drying time and cause minimum damage to the product. This book includes a several number of chapters that discuss some of the most important theoretical advances, computational developments and technological applications of food preservation and transport processes.

The topics that will be presented in this Volume will be going to the encounter of a variety of scientific and engineering disciplines, such as chemical, agricultural, mechanical engineering, etc…The book is divided in 9 chapters that intend to be a resume of the current state of knowledge for benefit of professional colleagues, scientists, students, practitioners, lecturers and other interested parties to network.

In Chapter 1, Mesquita de Queiroga *et al.* provide an experimental study related to the drying of the tamarind fruits to obtain the ideal characteristics for the development of food flour and to evaluate the physical-chemical quality and to determine the bioactive compounds of the tamarind flour. In Chapter 2, Rufino Franco *et al*. focuses on the study of an analytical modeling of mass transfer in wet porous bodies during the continuous and intermittent drying process in fixed bed. Experimental data were used to estimate the diffusion coefficient. Under the considered operating conditions, it was verified that intermittent drying provides reduction in effective operating time when compared to continuous drying. This is followed by Chapter 3, by Barbosa de Lima *et al.* who present a numerical study of heat transfer in the cooling, freezing and post-freezing of liquid food. Numerical results of the temperature distribution at different process instants are presented and analyzed, and temperature data at the center of the product throughout time were compared to experimental data reported in the literature and a good agreement was obtained. In Chapter 4, Rodrigues Mangueira *et al.* provide information, through numerical computational simulation, the physical aspects of the duck egg white foam-matdrying process. In Chapter 5, Soares de Melo *et al.* present a mathematical model, based on the thermodynamics of irreversible processes to describe the heat and mass transfer (liquid and vapor) during the drying of bodies with oblate spheroidal geometry.. This is followed by Chapter 6, by Bezerra Pessoa *et al.* who present a study of the osmotic dehydration process of cassava cubes (*Manihot esculenta*Crantz.) in ternary solutions containing water, sucrose, and sodium chloride. In Chapter 7, Agra Brandão *et al.* propose a numerical study to describe the cooling and freezing processes of cashew apple using computational fluid dynamics technique. Experiments of cooling and freezing of the fruit, with the aid of a refrigerator,data acquisition system and thermocouples, and simulation using Ansys CFX® software for obtain the cooling and freezing kinetics of the product were realized. In Chapter 8, Sousa Santos *et al.* present a numerical study to predict the drying process of a ceramic brick in an oven using the computational fluid dynamics analysis. A

comparison between the predicted and experimental data of the average moisture content and temperature of the brick along the process was done and a good agreement was obtained. Finally, in Chapter 9, Silva Canuto *et al.* present an experimental and numerical study of adsorption fundamentals using biomass as adsorbents in the removal of metallic ions. The research showed the importance of many factors that affects the adsorption, such as the biomass superficial area, system temperature, pH, initial concentration of the metal, biomass amount and status (living or dead).

J.M.P.Q. Delgado

A.G. Barbosa de Lima