Building a multilevel modeling network for lipid processing systems

The aim of this work is to present the development of a computer aided multilevel modeling network for the systematic design and analysis of processes employing lipid technologies. This is achieved by decomposing the problem into four levels of modeling: i) pure component property modeling and a lipid-database of collected experimental data from industry and generated data from validated predictive property models, as well as modeling tools for fast adoption-analysis of property prediction models; ii) modeling of phase behavior of relevant lipid mixtures using the UNIFAC-CI model, development of a master parameter table and calculations of the activity coefficients (VLE) related to a multicomponent system; iii) development of a model library consisting of new and adopted process models of unit operations involved in lipid processing technologies, validation of the developed models using operating data collected from existing process plants, and application of validated models in design and analysis of unit operations; iv) the information and models developed are used as building blocks in the development of methods and tools for computer-aided synthesis and design of process flowsheets (CAFD). The applicability of this methodology is highlighted in each level of modeling through the analysis of a lipid process that has significant relevance in the edible oil and biodiesel industries since it determines the quality of the final oil product, the physical refining process of oils and fats.