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Preface of special issue on Drying: Technological Trends, Energy Efficiency and Environmental Issues

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Drying is a separation process which consists on the removal of water or any solvent by evaporation from solid, semi-solid or liquid form. Drying process can be a necessary operation to make the final dried material practical or exploitable such as for wood, ceramics, pulp and paper and textile or can be used as a preservation method for foodstuffs.

Compression, centrifugal forces and gravity are the main operations used to perform the mechanical drying, generally called dewatering. However, thermal drying is the most common method used in the different industries and is obtained by putting the material in direct or indirect contact with a source of heat. Mainly, thermal drying is performed using convective, conductive or radiative method. Convective drying happens by means of a second gaseous medium, such as heated air, which surrounds the studied material. The contact between the gaseous medium and the material allows the transfer of the heat into the product resulting in evaporation of its moisture. During conductive drying, the material is in direct contact with a heated surface which leads to the moisture evaporation of the product. In order to enhance the efficiency of this method, generally agitation is added in order to renew the contact between the heated surface and the tested material. The design of the equipment used for this method allows drying materials having a liquid form. Radiative method using infrared, microwave, solar energy or other sources of radiation is also a growing method that finds more and more applications in industries.

Usually, an important amount of heat or energy is needed to perform the drying process, which makes it as an intensive and energy consuming operation. Research and Development (R&D) in the field are then intensively explored in order to have a high quality of the final product, to reduce the cost of the process and make it energetically efficient. Accordingly, design of the drying equipment with combination of different methods is the main subject treated by R&D. Knowing the fundamental aspect permits to determine the behaviour of the tested material during drying process with the different phenomena occurring. Modeling and simulation with application of heat and mass transfer balances, including studying the energy efficiency, energy recovery and re-use with emphasis on exergy are also important axes that are actually explored in drying field in order to enhance the efficiency of the process.

EE-Energy Efficiency is a growing research area that is lately attracting global attention of scientists, engineers and researchers in new techniques in drying. Modeling and simulation studies are then necessary to have a proper design of the drying equipment.

This special issue of International Journal of Energy Engineering entitled: "Drying: Technological Trends, Energy Efficiency and Environmental Issues" presents studies dealing with convective, conductive and radiative drying methods with application to food, wood and chemical products. Mathematical modeling and simulation, by application of heat and mass transfer balances, or modeling the drying kinetics using theoretical and semi-empirical models, are widely present in the published papers. Technical solutions of industrial installations for dewatering and drying wood bark are presented and developed in one paper. Unfortunately, the environmental area related to gaseous emissions and the life cycle assessment during drying is still presenting a lack of studies, and are absent among the submitted and selected papers of this issue.

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