



## Modern Drying Technology, Process Intensification: Volume 5

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The five-volume series provides a comprehensive overview of all important aspects of drying technology like computational tools at different scales (Volume 1), modern experimental and analytical techniques (Volume 2), product quality and formulation (Volume 3), energy savings (Volume 4) and process intensification (Volume 5).

Based on high-level cutting-edge results contributed by internationally recognized experts in the various treated fields, this book series is the ultimate reference in the area of industrial drying. Located at the intersection of the two main approaches in modern chemical engineering, product engineering and process systems engineering, the series aims at bringing theory into practice in order to improve the quality of high-value dried products, save energy, and cut the costs of drying processes.

**Volume 5** is dedicated to process intensification by more efficient distribution and flow of the drying medium, foaming, controlled freezing, and the application of superheated steam, infrared radiation, microwaves, power ultrasound and pulsed electric fields. Process efficiency is treated in conjunction with the quality of sensitive products, such as foods, for a variety of hybrid and combined drying processes.

### Other Volumes and Sets:

Volume 1 - Modern Drying Technology, Computational Tools at Different Scales

**Volume 1:** Diverse model types for the drying of products and the design of drying processes (short-cut methods, homogenized, pore network, and continuous thermo-mechanical approaches) are treated, along with computational fluid dynamics, population balances, and process systems simulation tools. Emphasis is put on scale transitions.

Volume 2 - Modern Drying Technology: Experimental Techniques

**Volume 2:** Comprises experimental methods used in various industries and in research in order to design and control drying processes, measure moisture and moisture distributions, characterize particulate material and the internal micro-structure of dried products, and investigate the behavior of particle systems in drying equipment. Key topics include acoustic levitation, near-infrared spectral imaging, magnetic resonance imaging, X-ray tomography, and positron emission tracking.

Volume 3 - Modern Drying Technology: Product Quality and Formulation

**Volume 3:** Discusses how desired properties of foods, biomaterials, active pharmaceutical ingredients, and

fragile aerogels can be preserved during drying, and how spray drying and spray fluidized bed processes can be used for particle formation and formulation. Methods for monitoring product quality, such as process analytical technology, and modeling tools, such as Monte Carlo simulations, discrete particle modeling and neural networks, are presented with real examples from industry and academia.

#### Volume 4 - Modern Drying Technology: Energy Savings

**Volume 4:** Deals with the reduction of energy demand in various drying processes and areas, highlighting the following topics: Energy analysis of dryers, efficient solid-liquid separation techniques, osmotic dehydration, heat pump assisted drying, zeolite usage, solar drying, drying and heat treatment for solid wood and other biomass sources, and sludge thermal processing.

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