

Dynamic Modeling of Supercritical Drying Process for Solvent Removal inside the Porous Material

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Extremely porous material such as aerogel can be widely applied in various fields of industry, since it has very advantageous properties such as large interfacial area, superior heat insulation, and so on. To merchandise the manufactured porous material, all remaining solvents or agents for treatment inside the pore should be completely removed. When it comes to supercritical critical drying, which is sometimes but effectively utilized for the removal of remainder in the pore, a phase change of the mixture in the pore must be carefully considered to prevent the damage induced by capillary force. Also, a reduction of manufacturing cost is essential for the successful commercialization due to the high pressure and temperature of supercritical process.

Therefore, dynamic modeling for a general supercritical drying process with cyclic operation of extractor has been performed. The model includes the composition of mixture in pores so that the phase can be examined during the operation. It is expected that suitable type-by-type operation strategies, including a way of supplement for the recycled drying agent, as well as optimal operating conditions can be proposed through the model.