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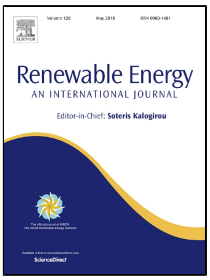

Accelerating drying process of tomato slices in a PV-assisted solar dryer using a sun tracking system

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Accelerating drying process of tomato slices in a PV-assisted solar dryer using a sun tracking system

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Abstract

This study was aimed to examine the effect of sun tracking system on the solar drying kinetics of biological materials. A lab-scale PV-assisted solar drying system equipped with a sun tracking unit was designed and fabricated to study the drying behavior of tomato slices during the drying process. The samples were tested at different air velocities (0.5–2 m/s) and product thicknesses (3–5 mm) with and without application of sun tracking mechanism. The effect of sun tracking system on the drying behavior of tomato slices was evaluated by considering the drying time, effective moisture diffusivity and activation energy. According to the results obtained, the sun tracking system profoundly shortened the drying time from 16.6% to 36.6%. Application of the system substantially increased the effective moisture diffusivity in the ranges of 9.1–64.6% and the activation energy without any negative effect on the quality parameters of dried samples, i.e., color, rehydration ratio, and shrinkage. Overall, the sun tracking system could be a promising approach not only for accelerating solar drying process but also for propelling this drying technology one step further towards the industrial applications.