

Title Effect of expansion by instantaneous controlled pressure drop on dielectric properties of fruits and vegetables

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Abstract

The instantaneous controlled pressure drop (DIC) treatment is used for creation of a porous structure during drying of fruits and vegetables. DIC is based on high temperature, short time heating followed by an abrupt pressure drop into a vacuum. This abrupt pressure drop provokes auto-vaporization of the superheated liquid, expansion and breaking of the cell walls and instantaneous cooling. This process step is inserted between two drying stages at a moisture content of about 20% wet basis. The use of microwave radiation would provide more rapid and homogeneous heating than using steam in the DIC treatment and hot air during the final stage of drying. For that purpose the dielectric properties of the raw and DIC treated products were measured. The measurements were carried out with an open-ended coaxial probe at a frequency of 915 MHz in the range of temperatures 20–90 °C and moisture content 5–80% w.b. Three regions were revealed for the dependences of the dielectric constant and loss factor on moisture content. At low moisture content, these properties increased linearly with moisture content. At the middle moisture content, the increase was also linear but much steeper. At high moisture content, the dielectric properties were constant. The limits of these regions were different for ϵ' and ϵ'' as well as for the products. The dielectric properties were slightly temperature dependent. The penetration depth increased with decreasing moisture content. The DIC treated products exhibited slightly lower dielectric properties than the raw products.