

NEW THERMAL TREATMENTS FOR STABILIZING HEAT-SENSITIVE FRUIT AND VEGETABLE PRODUCTS

THE CHALLENGE

CURRENT ADVANCES IN PRESERVATION TECHNOLOGIES AIM TO OVERCOME THE LIMITATIONS OF CONVENTIONAL THERMAL TREATMENTS USED FOR STABILIZING HEAT-SENSITIVE FRUIT AND VEGETABLE PRODUCTS, SUCH AS JUICES, SMOOTHIES, PUREES, HOMOGENATES OR POWDERS. NEW TREATMENTS SEEK A BALANCE BETWEEN THE THERMAL DAMAGE TO THE PRODUCT AND ITS STABILITY AGAINST DETERIORATION. THE SO-CALLED NON-THERMAL EMERGING TECHNOLOGIES HAVE REPRESENTED SOME PROGRESS IN THIS REGARD BUT PRESENT CERTAIN LIMITATIONS. THE IMPLEMENTATION OF NEW PRESERVATION PROCEDURES MAY IMPROVE THE QUALITY AND STABILITY OF FRUIT AND VEGETABLE PRODUCTS.

TECHNOLOGIES DESCRIPTION

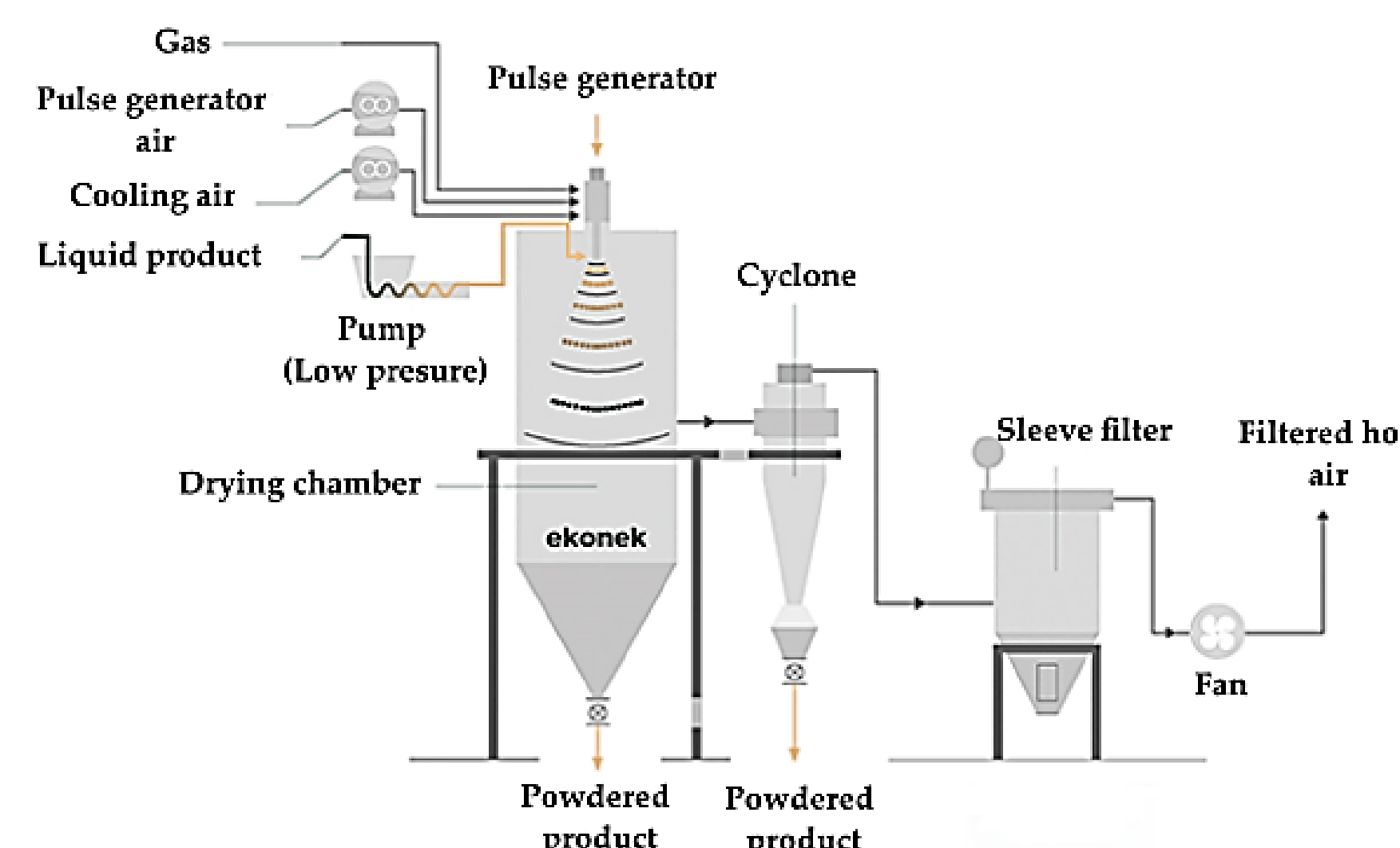
HIGH-PRESSURE THERMAL STERILIZATION (HPTS):

- HPTS COMBINES A PREHEATING STAGE (70-90°C) WITH A HIGH-PRESSURE TREATMENT (400-600 MPa) AT 90-120°C. A CANISTER SYSTEM IS USED TO IMPROVE THE EFFICACY OF PROCESS.
- PREHEATING MAY SOLVE THE PROBLEM OF LACK OF ENZYME INACTIVATION IN FRUIT AND VEGETABLE PRESSURIZED PRODUCTS. SHELF-STABILITY MAY BE IMPROVED AND THERMAL DAMAGE TO THE PRODUCT MAY BE REDUCED.
- HIGH-PRESSURE INDUSTRIAL EQUIPMENT IS AVAILABLE FOR DISCONTINUOUS BATCHES IN SMALL AND MEDIUM-SIZED FACTORIES, WHICH CAN BE COUPLED TO DIFFERENT PREHEATING SYSTEMS.



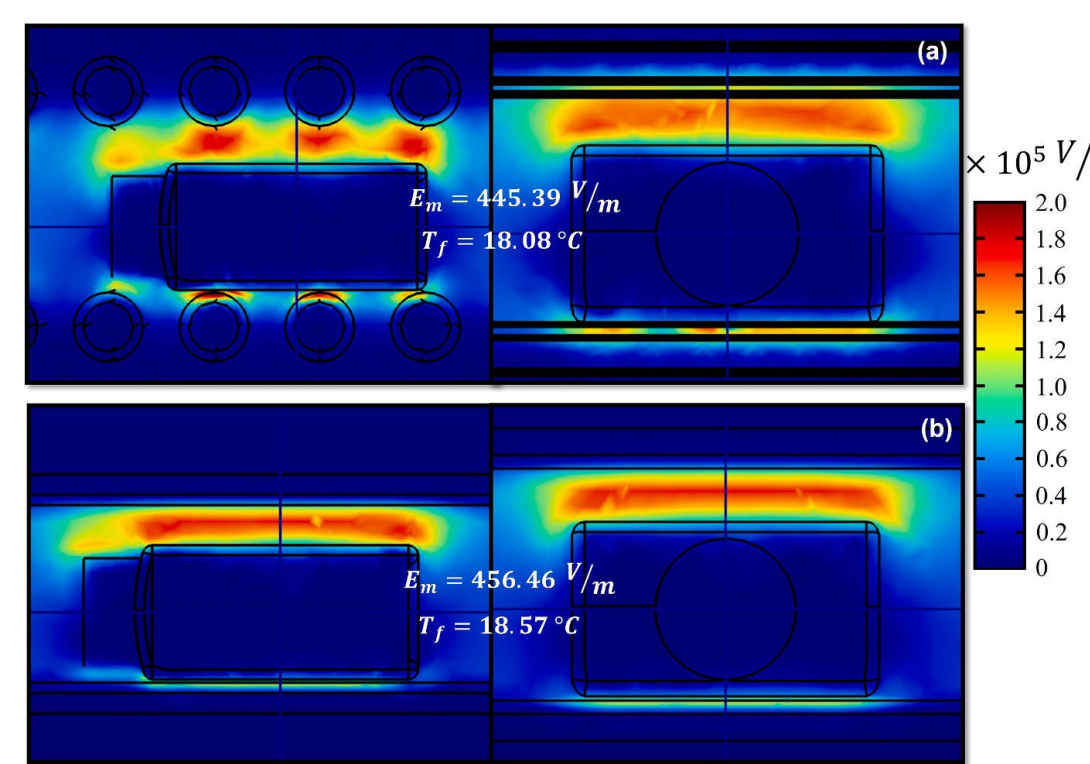
PULSE SPRAY DRYING (PSD):

- PSD TECHNOLOGY USES A GAS BURNER WITH A HIGH FREQUENCY PULSE GENERATOR THAT ACCELERATES THE LIQUID DROPLETS IN A LONG SPRAY, THUS INCREASING EVAPORATION SPEED AND REDUCING THE AIR AND ENERGY CONSUMPTION.
- THIS PROCESS DOES NOT GENERATE TOXIC COMPOUNDS AND EXHAUST GASES COMPLY WITH REGULATIONS. PSD CAN IMPROVE THE RESULTS OF CONVENTIONAL SD IN VISCOUS LIQUIDS OR PASTES.
- INDUSTRIAL EQUIPMENT IS AVAILABLE FOR POWDERING DAIRY AND OTHER PRODUCTS. SPECIFIC PILOT PROCESSES ARE BEING TESTED FOR FRUIT AND VEGETABLE PRODUCTS.



DIELECTRIC CONTINUOUS HEATING (DCH):

- FOOD IS CONTINUOUSLY HEATED BY APPLYING AN ALTERNATING ELECTROMAGNETIC FIELD THAT TRANSFERS ENERGY TO DIELECTRIC MATERIALS (WATER AND ELECTROLYTES).
- THIS TECHNOLOGY IMPROVES HEAT PENETRATION AND ENERGY TRANSFER (>80%), MINIMIZING ENERGY LOSSES. HEATING HOMOGENEITY MAY BE IMPROVED IN VISCOUS LIQUIDS, PACKED PRODUCTS OR SOLID PORTIONS.
- AVAILABLE INDUSTRIAL EQUIPMENT USES MAGNETRONS OR SOLID-STATE SYSTEMS WITH TRANSISTORS AND CAN OPERATE WITH RADIO FREQUENCIES (13.5, 27.12, AND 40.3 MHz) OR MICROWAVES (433, 915, AND 2,450 MHz).



OUR MULTIDISCIPLINARY RESEARCH TEAM:

- **FOOD TECHNOLOGY DEPARTMENT, UNIVERSITY OF MURCIA (UM):** DESIGN AND VALIDATION OF ELABORATION PROCESSES FOR FRUIT AND VEGETABLE PRODUCTS.
- **FOOD QUALITY AND TECHNOLOGY PROGRAM. INSTITUTE OF AGRIFOOD RESEARCH AND TECHNOLOGY (IRTA):** PILOT AND INDUSTRIAL IMPLEMENTATION OF PRESERVATION TREATMENTS FOR FRUIT AND VEGETABLE PRODUCTS.
- **FOOD TECHNOLOGY DEPARTMENT POLYTECHNIC UNIVERSITY OF VALENCIA (UPV):** SUSTAINABILITY ASSESSMENT OF FOOD UPSCALED PROCESSES.



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