

FREEZEWAVE

FREEZEWAVE project concerns the freezing of foods using a highly innovative technique combining freezing at slow rate with part time emission of microwaves (2450 MHz); this innovative concept has been investigated recently by ONIRIS and results showed that a 62% decrease of the average ice crystal size was acquired when samples were frozen under microwave irradiation compared to the control (Xanthakis et al., 2014, IFSET - study on pork meat). Freezing offers a quasi-infinite shelf life of food regarding the microbial risk and it is environmental friendly in that it reduces food wastes and offers convenience to the consumer (cook just what you need). Limitations in shelf life rather come from the deterioration of the quality of food which is due to: i) mechanical damage caused by ice crystals formation and ii) exposition of the matrix to concentrated solution caused by cryoconcentration. To improve the quality of frozen foods, fast freezing is usually recommended, resulting in a reduction of the ice crystals. However, a fast freezing increases the energy demand: low ambient temperature & high air velocity to enhance the rate of heat transfer are needed to achieve a fast freezing. This project proposes a highly innovative technique which showed that a small amount of emitted microwave energy combined to a slow freezing rate is able to refine ice crystal size in frozen meat. FREEZEWAVE project aims at expanding & optimizing the concept to several foods (sauce, meat, vegetable & ready to eat meals) and also at designing industrial equipment.

The novel concept is expected to concern the freezing equipment sector thanks to a French SME partner of the project and the global frozen food sector. FREEZEWAVE will provide scientific knowledge and new scientific insights in food freezing. Project's outcomes may also be of interest for non-food applications such as biotechnology.