



## **Fact Sheet DIL ELCRACK®**

### **Pulsed Electric Field Processing**

### **German Institute of Food Technologies DIL**

#### 1. What is ELCRACK®?

ELCRACK is an efficient cell disintegration technique. It can be used to induce poration of plant animal and microbial cells. ELCRACK can be used to enhance mass transport processes during extraction, pressing or drying of fruits and vegetables. Applied on liquids and semi-liquids it can achieve a non-thermal preservation while maintaining product quality and freshness.

#### 2. What is your benefit

ELCRACK can save time and money and improve your product quality. Slow mass transport processes, e.g. during drying of plant tissue are sped up, allowing a reduction of processing times. Juice or oil extraction yield is increased by a continuous, short time technique. Applied for preservation it offers to produce high quality, fresh like liquid foods with high nutritional und functional value.

#### 3. How does ELCRACK work?

ELCRACK involves the application of microsecond high voltage pulses in the order of 10 to 30 kV. The high voltage pulses applied induce pores in cell membranes, causing a loss of barrier function, leakage of intracellular content and loss of vitality. The treatment is applied continuously in a chamber - a setup of multiple electrodes. While being pumped through the treatment chamber the product is exposed to the high voltage pulses. The treatment time required is less than a second. The pulses are applied at repetition rates of up to 1000 per second to allow sufficient treatment of all volume elements. Besides electrical parameters such as field strength and specific energy input also the product temperature and its recipe have an impact on treatment intensity.

4. Which other ingredients does ELCRACK affect?

ELCRACK has a targeted impact on cell membranes. Whereas all kinds of vegetative spoilage and pathogenic microorganisms can be inactivated a limited effect on enzymes, spores and viruses is found. Also other constituents such as vitamins, minerals, pigments or flavours are retained. In contrast to a heat treatment the functionality and nutritional value of proteins is hardly affected.

5. Is food treated by ELCRACK novel food?

The Novel Food Legislation applies to food products and ingredients of certain categories placed on the market within the European community (EG 258/97). With regard to new production processes it has to be considered for foods where the new process causes significant changes in the composition or structure of the foods or food ingredients which affect their nutritional value, metabolism or level of undesirable substances. After an ELCRACK treatment no significant changes of the composition or structure, affecting nutritional value, metabolism or level of undesired substances have been shown so far. It can be assumed that a PEF treated fruit juice has not to be considered as Novel Food.

6. What types of foods can be treated?

Dependent on the aim of application solid, semi-liquid and liquid food can be treated. Treatment of plant or meat tissue – aiming on cell disintegration can be applied to whole fruits and tubers, pieces, fruit or vegetable mashes prior to separation processes. Practically no size limitation has to be taken into account for these applications. To achieve a microbial inactivation a higher treatment intensity is required, limiting the applicability to pumpable products with a particle diameter < 20 mm.

7. Is commercial scale equipment available?

DIL has developed industrial scale equipment with treatment capacities up to 10,000 l/hr for microbial inactivation and 25,000 kg/hr for cell disintegration. Suitable treatment chambers are also available. The equipment is industry ready and in compliant to all safety regulations.

8. Can ELCRACK be implemented in existing processing lines?

Yes, as a continuous process ELCRACK with low space requirements it can easily be implemented in existing lines. A typical processing line consists of a supply tank, a fluid pump, the ELCRACK system, a cooler if required and a buffer tank. The processing line can be CIP or SIP cleaned.

9. What costs are to be expected?

ELCRACK is a low energy process. Dependent on type of application the specific energy consumption is in a range of 10 to 100 kJ/l of product. The smaller the target cells are, the higher treatment intensity is required. In a commercial scale total costs of 1 Euro/ton (= 0,1 Eurocent per litre or kg) for treatment of plant cells and 10 Euro/ton (= 1 Eurocent per litre or kg) for microbial inactivation have to be expected.

10. Where can it be tested?

At DIL an ELCRACK pilot hall is available for test purposes, product development as well as challenge tests. Confidential product evaluations as well as validation of food safety and shelf life can be conducted. For field tests systems can be rented on a daily or monthly base.

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