Breakthrough in mild technologies for preservation of convenient seafood: from laboratory to industrial application

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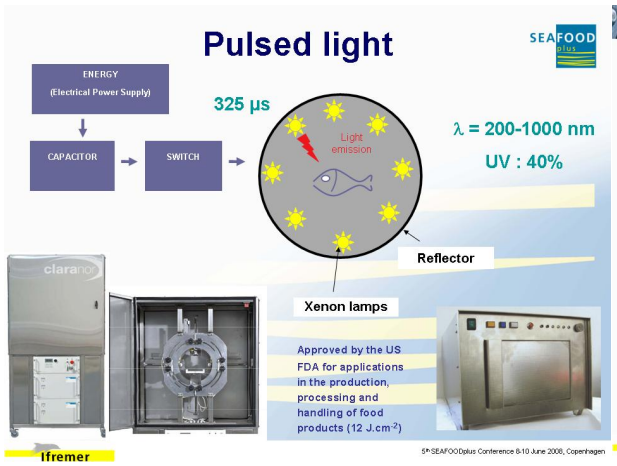

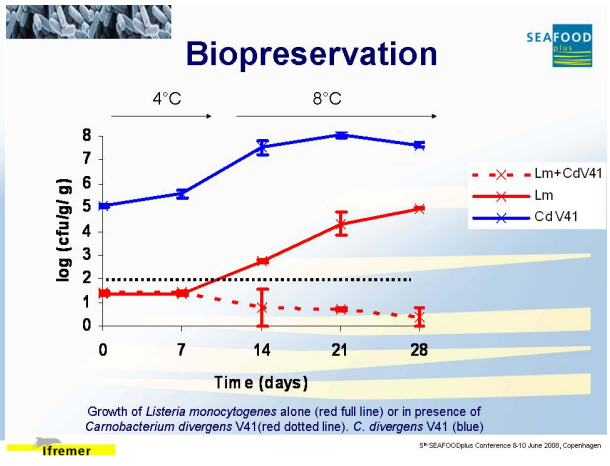

Convenient seafood products such as cold-smoked fish, carpaccio, desalted cod… are highly perishable due to possible growth of pathogenic bacteria (mostly *Listeria monocytogenes*) and spoiling microorganisms. To improve quality and safety, two strategies are developed within the frame of the HURDLETECH project. The first one consists in reducing the initial bacterial count using a mild decontamination technology that does not change the nutritional and sensory characteristics: pulsed light (PL). PL is a non-thermal process that involves the use of intense and short duration pulses (300 µs) of broadband white light. Process parameters have been optimised and depend on pulse energy, distance and position of the lamps, number of pulse etc. On surface model medium or in clear liquid, one flash of 0.7 J/cm^2 destroys 10^8 cfu/g, *L. innocua* being the most resistant bacteria among a wide collection of pathogenic or spoiling marine bacteria tested. In convenient seafood products, the effect is less important and is matrix dependent (1 log for cold-smoked salmon and desalted cod, 2.5 log for surimi) but doesn't depend on the bacterial concentration. The remaining bacteria are still able to grow during storage of the product. However, the initial contamination level in commercial products is low and this decontamination rate is sufficient to significantly delay the time for *L. monocytogenes* to reach the European limit of 100/g. No adverse effect on sensory parameters or lipid oxidation has been observed. A demonstration project involving seafood producers and PL designers is currently running. In case some bacteria still survive, the second strategy consists in limiting their growth during storage. Biopreservation is a new natural technology that consists in inoculating food products with bacteria selected for their antimicrobial properties against undesirable microorganisms without presenting themselves spoiling capacities. Lactic acid bacteria are good candidates since they have a wide range of antibacterial properties (acidification, H_2O_2 production, bacteriocin, nutrient depletion…), the GRAS status and benefit from the healthy image of dairy products. A strain of *Carnobacterium divergens* has been isolated from salmon and is active against a wide collection of *L. monocytogenes*. Inoculated in cold-smoked salmon at high level, it maintains the count of *L. monocytogenes* under the 100 *Lm*/g limit for more than 4 weeks of storage at 4 and 8°C. No acidification, TVBN and histamine production or changes in flavours, texture and colour are recorded. Production of this strain has been optimized and a molecular tracing method developed. This technology is now ready for a demonstration application. Furthermore, 4 new protective strains preventing convenient seafood products from spoilage have been selected and successfully tested in cold-smoked salmon and cooked/peeled shrimps. They belong to different genus and two strains constitute a new species. Using PL combined with biopreservation may be a new solution to extend shelf-life and comply with the EU legislation for *L. monocytogenes*.