



Newsletter n°2 August 2011 – February 2012

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The FRISBEE expected results

The project will develop new innovative mathematical modelling tools that combine food quality and safety together with energy, environmental and economic aspects to predict and control food quality and safety in the cold chain.

We expect FRISBEE to contribute to reductions in energy consumption in refrigeration processes. Worldwide, refrigeration consumes 8% of all energy and is responsible for 2.5% of greenhouse gas emissions; therefore any reduction in those figures will be a big improvement.

FRISBEE is a Refrigeration Innovation for Food Cold Chain Research European project IP. The four-year, 6 M euro project is funded mainly through the EU's 7th Framework Programme.

We have begun by developing a comprehensive database on the cold chain in Europe, identifying refrigeration needs and available current technologies in the food industry, and investigating consumer needs and expectations with respect to the food cold chain.

FRISBEE Partners

26 partners; comprising 13 companies, 11 research institutes or universities, and 2 non-governmental organisations.

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NEWS

FRISBEE welcomes its Advisory Board

FRISBEE welcomes its Advisory Board composed of large food producers (Nestlé and SOREDAB), food and beverage associations, refrigeration

equipment manufacturers (GEA), storage stakeholders and federations. They will provide important advice regarding the scientific and technical

orientation of the project. **You can still apply to join the FRISBEE Advisory Board!!**

TAKE PART in the Refrigeration Technology ENERGY FOOD COLD CHAIN SURVEY!

Join the first European Food cold chain survey that is finding out what end users in the food cold chain want. We are collecting information from end users in the food cold chain regarding how they use refrigeration and how much energy they use. In the survey, we are seeking information on:

- Refrigeration technology data
 - Refrigerant data
 - Refrigerant leakage
 - Energy consumption data
 - Energy saving devices
- The information will then be used to assess end users' needs and to guide research work conducted within the FRISBEE project.

Any data you submit will be confidential, and by providing information you will have privileged access to the final report generated by the survey.

If you would like to take part please go to:
<http://www.surveymonkey.com/s/52XTZGJ>

FRISBEE project launches its FIRST FOOD PRODUCT COLD CHAIN DATABASE COLDBASE and it's not too late to JOIN US!!

FRISBEE project is launching the first European food cold chain database. The FRISBEE database already contains several thousands of files on the cold chain that have been collected thanks to industrial and volunteer participation!!! Thousands of files on cold chain food temperatures, from sev-

eral countries, are already available to the participants. You can still become involved, upload your data files and provide us with your name and e-mail list of potential contributors.

If you are interested, go to:
<http://frisbee-wp2.Chemeng.Ntua.Gr>

If you have data on the product cold chain, you may become a contributor. You will have privileged access to this database (thanks to a login and password) and access to the database will be secured.

RESEARCH

Nanoparticles, a concentrate of energy: PCM nanoparticles where low temperatures are needed

The Spanish Research Center CSIC in the FP7 FRISBEE project has succeeded in introducing nano-biostructured PCMs (Phase Change Materials) into renewable materials

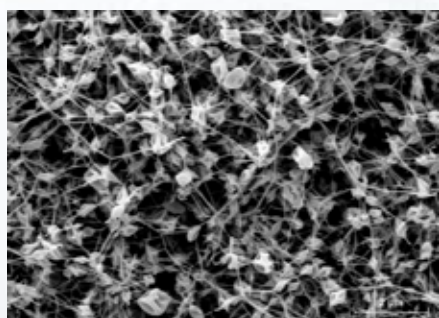


Figure (a). Nano-structured composite PCMs (Phase Change Materials)

or onto surfaces by a proprietary process (patent application number **201131063**).

These nano-structured composites show in the Figure (a) will make it possible to store more efficiently a large amount of energy thanks to the high surface volume ratio and dispersion of the PCM.

We have selected several PCM materials based on suitable melting temperatures for thermal energy storage according to the refrigeration equipment.

The PCM nanoparticles were characterised in terms of loading capacity, sealing capacity as well as kinetic diffusion as a function of the range of temperatures covered by the nano-structured PCM particles from 5°C to -18°C).

The results are very encouraging and the CSIC has already succeeded in achieving an encapsulation efficiency of the PCM of around 60-70% depending on the system.

Air cycle refrigeration modelling: the potential in food cold chain applications

The refrigeration team at LSBU has extensive experience with air cycle refrigeration and heat-pump systems and this is now benefiting the FRISBEE project. A mathematical model of an air cycle system for combined heating and cooling has been developed and validated with previous experimental data. It is now being used to assess the potential of this technology in food cold chain applications, and the team will go on to source and cost suitable components for the most promising applications. Air cycle refrigeration can offer an environmental alternative to existing refrigeration systems in use in the food cold chain. Air cycle is already used for certain niche applications like aircraft and train air conditioning

(e.g. Figure 1), where it offers considerable benefits. In the food industry, air cycle compares most favourably with existing low-temperature refrigeration systems, especially where there is a need for heating which can be served by the high-temperature heat rejected from the air cycle system.

Air cycle can also offer the potential for processing at far lower temperatures than those normally produced by conventional vapour compression refrigeration systems, where the competition is currently limited to expensive and energy intensive total loss refrigerants such as liquid nitrogen.

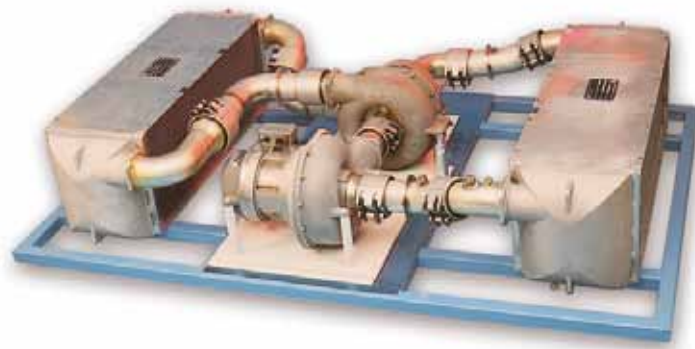


Figure 1. Air cycle train air conditioning unit (Honeywell, UK)

Food quality models: Ice cream under the microscope and ice crystal growth in the cold chain

Ice cream is a product whose quality is highly correlated to the storage temperature and temperature fluctuations. There are limited data in the literature (see Figure 2) concerning

modelling of the effect of temperature on texture, viscosity and ice recrystallization.

and modelled vs time and storage temperature. Equations will be developed to describe the effect of storage conditions on texture and viscosity parameters.

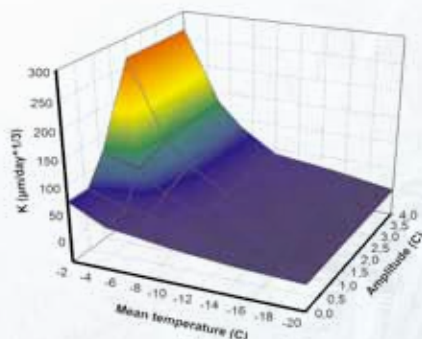


Figure 2. Crystal growth as a function of temperature and amplitude. Source: Ben-Yoseph E. & Hartel R. W. (1998)

The National Technical University of Athens (NTUA), within the framework of the FRISBEE project, will conduct experiments in order to investigate the effect of static and dynamic storage temperature conditions (fluctuations of temperature are a significant factor to be studied). Texture, viscosity and ice recrystallization will be studied using appropriate equipment and methodology.

For the corresponding description of ice recrystallization, existing published equations will be used. The validation of these models (concerning ice recrystallization) is of great significance since these equations have been assumed by simulating the cold chain of the ice cream. Real cold chain scenarios from collected data on the cold chain will be used.

The data obtained will be evaluated

UPCOMING FRISBEE EVENTS

Date	Name of the Event	Organised by	Location
22-26 August 2011	IIR International Institute of Refrigeration Congress	IIR, VSCHT	Prague, Czech Republic
25 August 2011	FRISBEE Workshop	VSCHT	Czech Republic
4 October 2011	Presentation of the FRISBEE project at the Food For Life France meeting	ANIA	Paris
19 October 2011	Cibus Tech Food Processing & Packaging Technology Exhibition	Federalimentare	Parma, Italy
19, 20 and 21 October 2011	FRISBEE Mini-conferences	ACTIA	Paris
7 November 2011	European Technology Platform	Federalimentare	Belgium



www.frisbee-project.eu

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