VII INTERNATIONAL SEMINAR

BIOPOLYMERS AND SUSTAINABLE COMPOSITES

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AIMPLAS

BIOSMART
BIOMATERIALS FOR SMART FOOD PACKAGING

BIO-BASED INDUSTRIES Public-Private Partnership

BIO-BASED INDUSTRIES
Joint Undertaking
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Biobased Smart packaging for enhanced preservation of food quality

http://Biosmart-Project.eu

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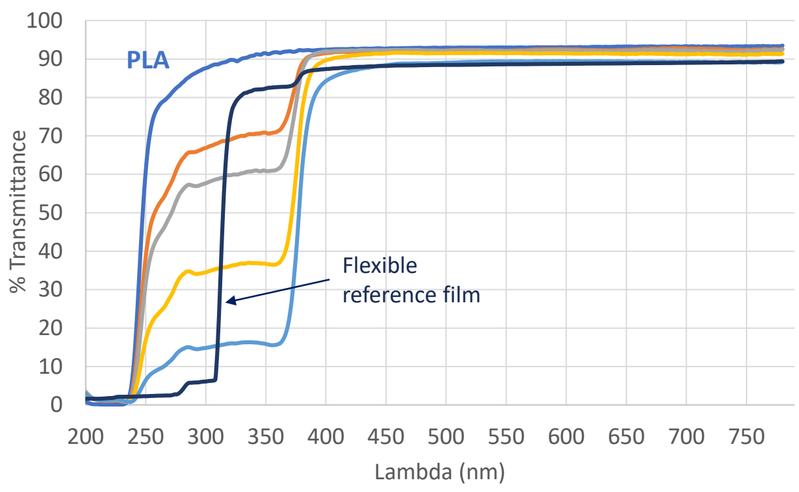
Current food packages typically are lightweight and address highly tailored performance needs. However, they are composed of multiple and different plastics often including aluminium. These are difficult to recycle for individual components.

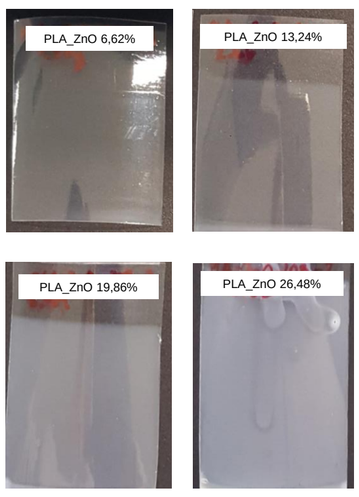
The challenge is addressed by developing an all compostable strongly simplified package with modifiable mechanical and barrier properties.

The **BIOSMART** project is developing **smart bio-based and/or compostable packages** to meet the needs of both fresh and pre-treated **food applications.** **BIOSMART** encompasses an approach for selectively integrating super-hydrophobic surfaces, micro-encapsulated phase change materials, barrier coatings, sensor devices and new bio-active antimicrobial and antioxidants, into fully bio-based multilayer flexible and rigid plastic packages.

1.- UV-SHIELDING PROPERTIES

UV light causes photo-oxidative degradation which can adversely affect the taste, odour and/or colour of food and beverage affecting the shelf-life of a product. **Sol-gel hybrid coatings containing metal oxide nanoparticles were used** to protect the packaging and food **against natural or artificial UV radiation.**



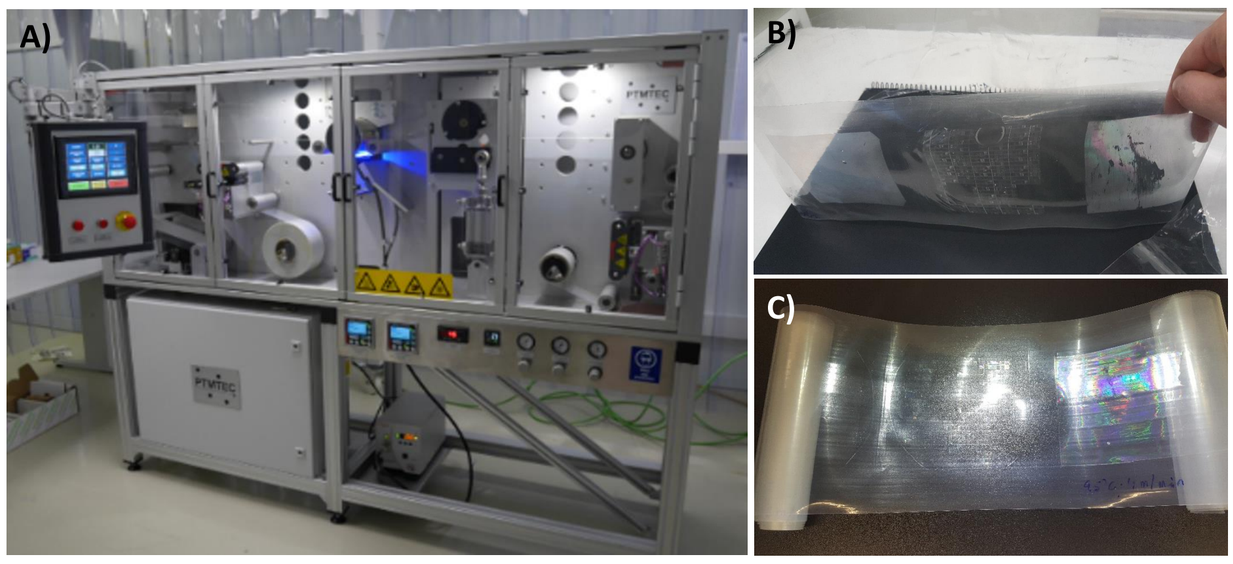


Comparisson of the transmittance spectra of PLA and PLA coated films showing a UV shielding effect from 200 to 375 nm. The blocking effect of UV light is higher with the increasing of the ZnO nanoparticles in the solgel matrix. The percentage of ZnO nanoparticles is calculated in relation to the silicon content in the coating.

Home made robotic spray system for the scale up application of different coatigs over flexible and rigid substrates. ©TEKNIKER

2.-TOPOGRAPHICAL FEATURES

Roll to roll nanoimprint lithography (R2R-NIL) technology to **up-scale** the transfer of microstructures with **anti-microbial, hydrophobic and self-cleaning properties** to biobased or compostable materials.



A) R2R-Thermal and UV-Nanoimprint Lithography setup to up scale structured films. Scaled up **microstructured** B) **PLA** and B) **Bio-PE** by thermal R2R. C) Confocal image of microstructured Bio-PE and D) Scanning electron microscopy (SEM) image of nanostructured PLA by Nanoimprint litography.

3.- THERMO REGULATION

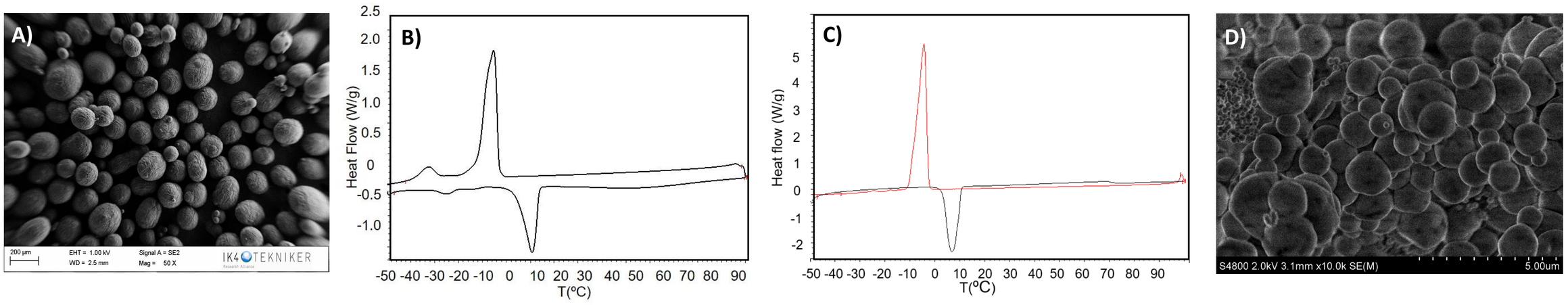
Encapsulation of vegetable bio-based Phase Change Materials (PCMs) for packaging thermal control. Development of packages with **thermoregulation capability** which leads to the creation of a sustainable and integrated cold chain packaging solution to mantain food freshness over a longer time.

Organic Encapsulation

ΔH_m(J/g)	T_m (°C)	ΔH_c(J/g)	T_c (°C)
-77	10	75	-8

Inorganic Encapsulation

ΔH_m(J/g)	T_m (°C)	ΔH_c(J/g)	T_c (°C)
-142	8	137	-8



A) SEM image of organic capsules containing biodegradable PCM. B) Differential scanning calorimetry thermogram (DSC) of the organic capsules. C) DSC thermogram of inorganic capsules. D) SEM image of inorganic capsules containing biodegradable PCM.

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