

UNIQUE SURFACE PROPERTIES

Utilisation of pioneering
nanomaterials for enhanced
Hydro- & Oleo- Phobicity

Chimar Hellas S.A.

BINDING INNOVATION



NanoPhos

Pioneering
Nanotechnology



48th International Wood
Composites Symposium

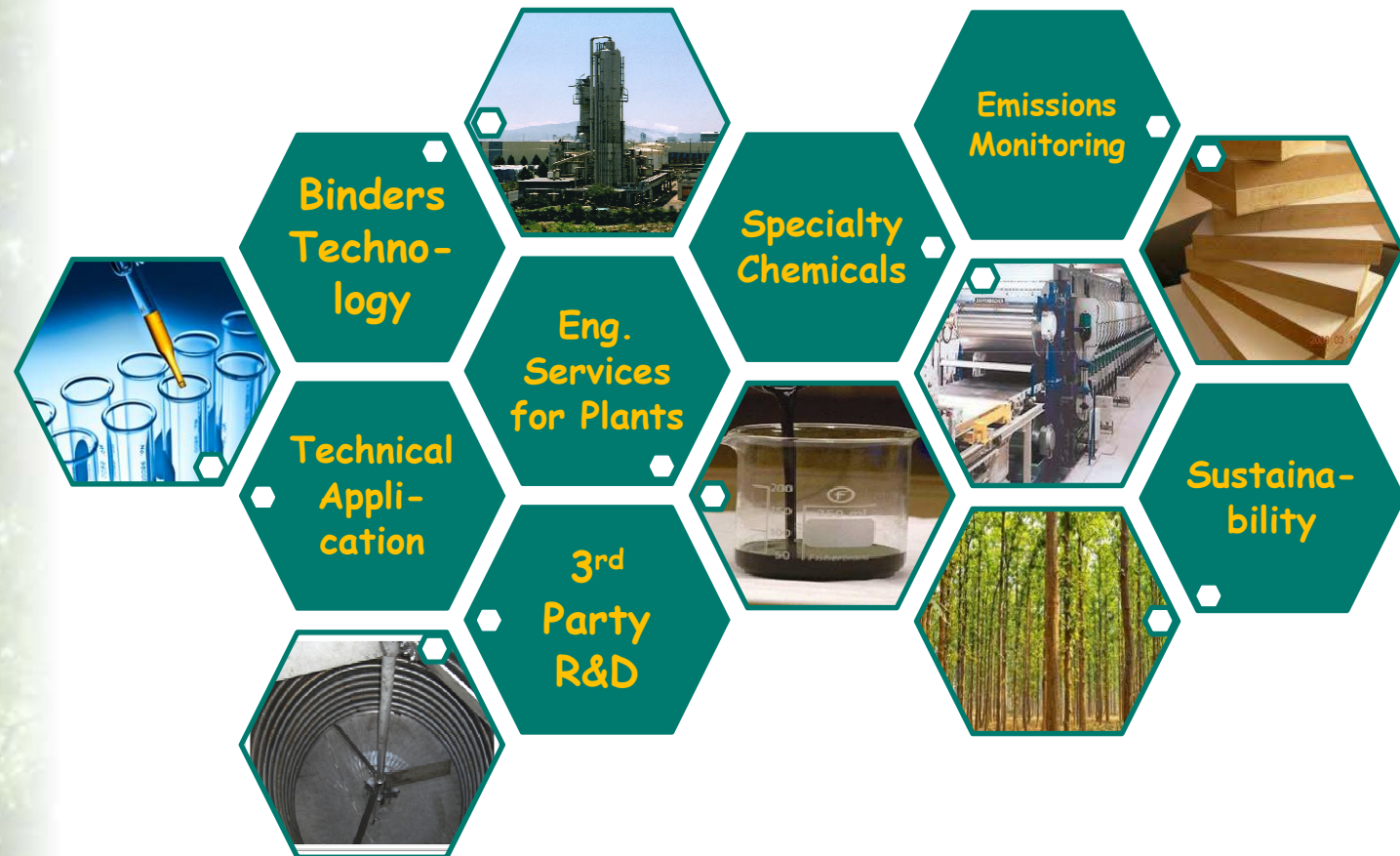
Paschalis Tsirogiannis



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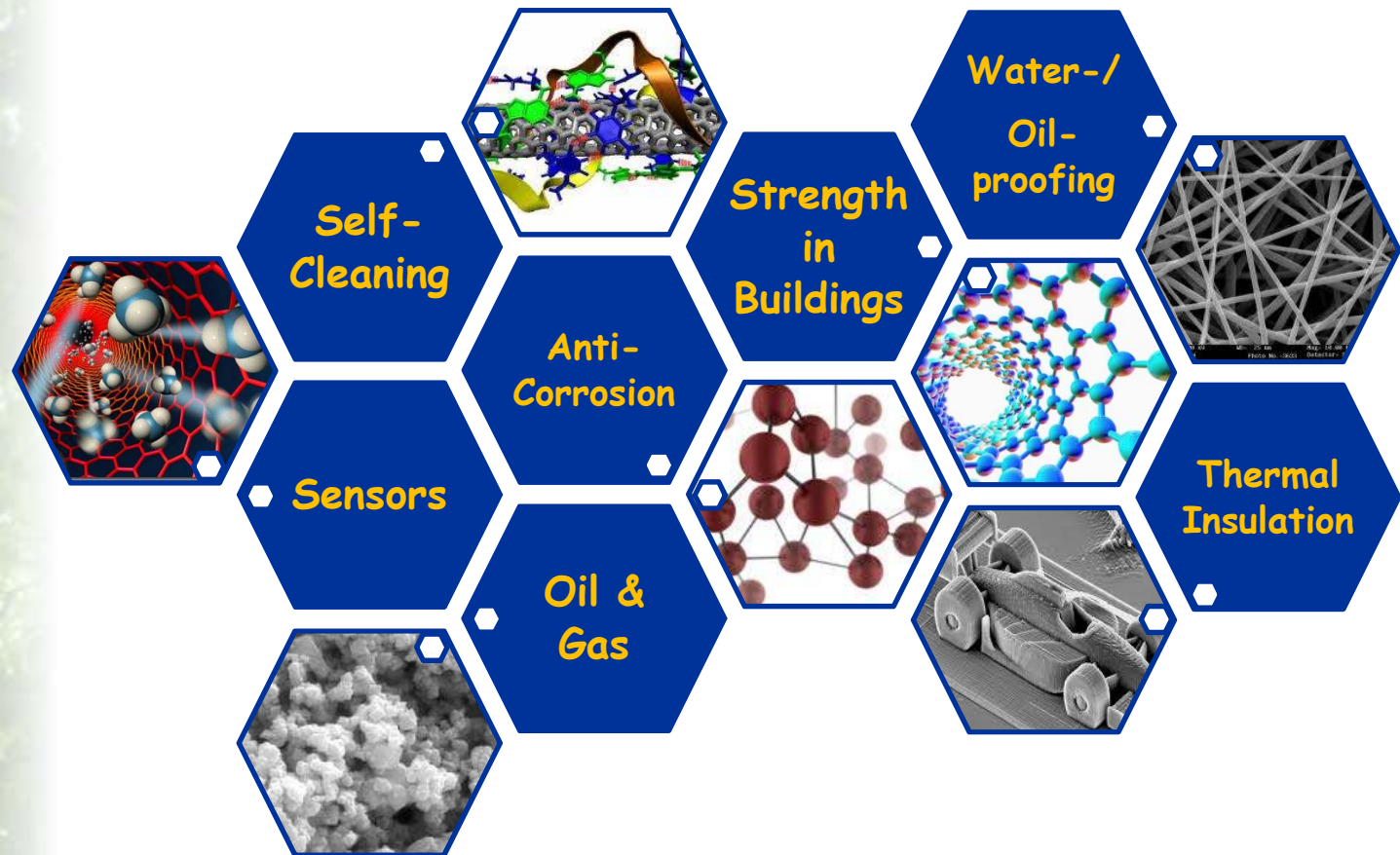
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Acting globally, helping locally

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1. Introduction

Market Trend on Surfaces

- High gloss surfaces were always attractive to people
- Last 10yrs, high gloss surfaces are becoming more and more fashionable
- Lamination technology evolved to produce TFL surfaces using Melamine-based impregnation syrups with "Glossiness" greater than 95





2. The Issue

Although these surfaces are of advance aesthetics, they all have an inherited issue:

- Avoiding fingerprint marks and in general keeping these surfaces on the desired state introduces extended household work to the end user
- The reason is that the reflection of the mark visually doubles the defect perception
- Additionally, the chemical affinity of fat with the Melamine surface makes the removal of the mark harder



- Similar effect but to a smaller degree have water soluble stains



3. The solution

The majority of stains are either Water or Oil soluble, so by making surfaces having less affinity with the each of these substances, the stain does not penetrate deeply and is easily removable

Nanotechnology Utilization →
Practical tools to face the technical challenges

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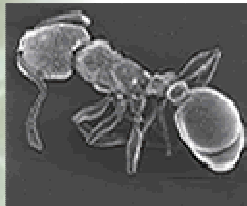
A pioneering nanotech additive was generated. The surfaces produced by using this technology exhibit strong resistance to staining including fingerprint mark resistance without jeopardizing the glossiness of the finished product.

What is nano?

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Ant = 5,000,000 nm



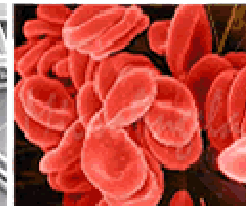
Pinhead Dia. = 1,500,000 nm



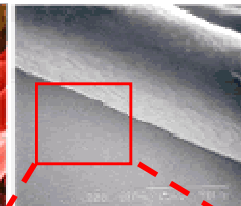
MEMS = 10,000 - 100,000 nm



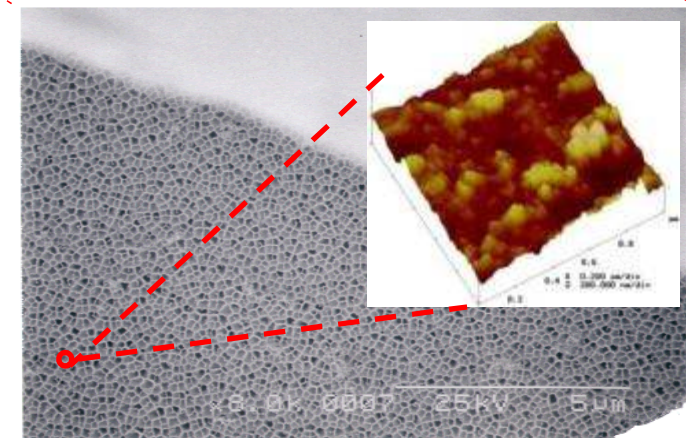
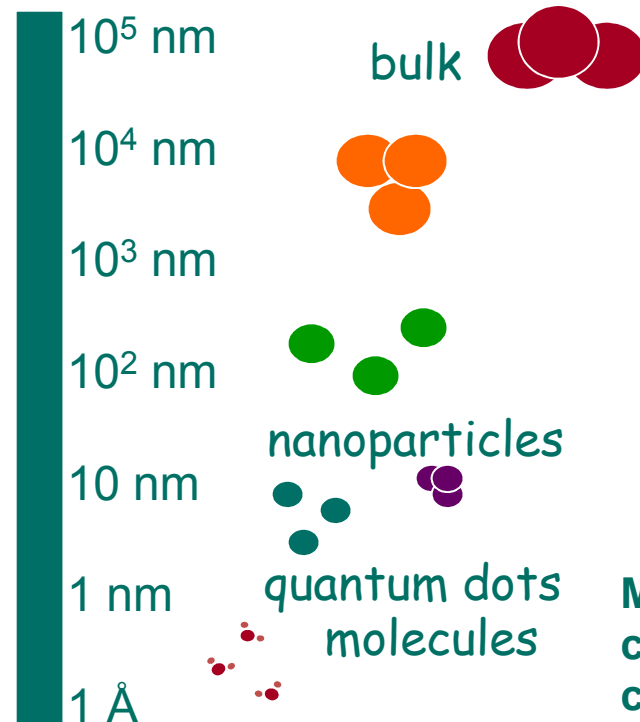
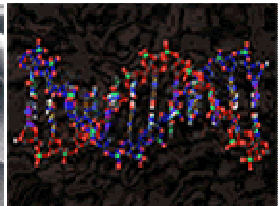
Red Blood Cell = 7,500 nm



Human Hair Dia = 100,000 nm



DNA Diameter = 2.5 nm



Materials reduced to the nanoscale can show different properties compared to what they exhibit on a macroscale, enabling unique applications.



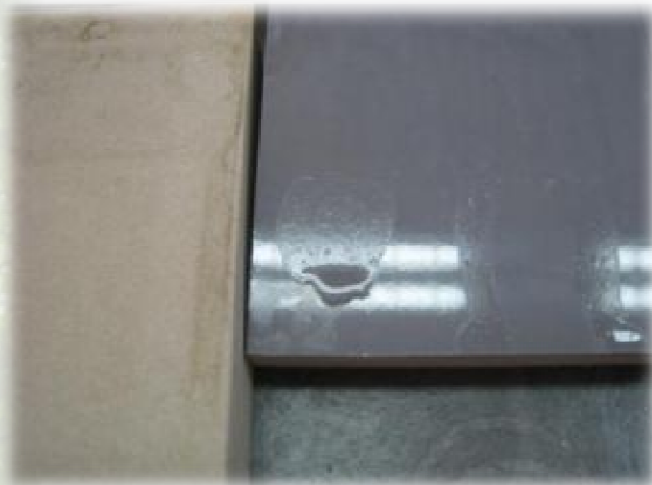
What is oleophobicity

- When a surface has low affinity with fats and oils, is said to be “Oleophobic” (antonym “Oleophilic”)
- Typical remedy for the creation of Oleophobic surfaces is making them “Hydrophilic” (Water friendly)
- In the case of TFL boards, both “phobias” are demanded



The TFL Case

- Melamine- and to a smaller extend, Urea- based lamination polymers, offer reasonable water repellency but at the expense of oil-phobia



Oil on Standard Grade Surface



Oil on Nano-Modified Surface

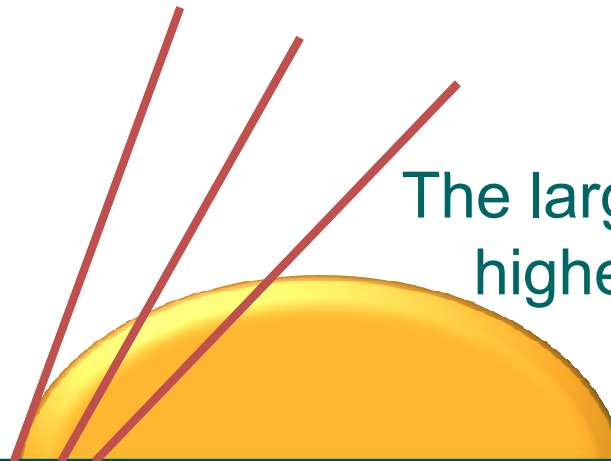


How repellency is measured

Common measurement is of “Contact angle”

- Static
- Dynamic

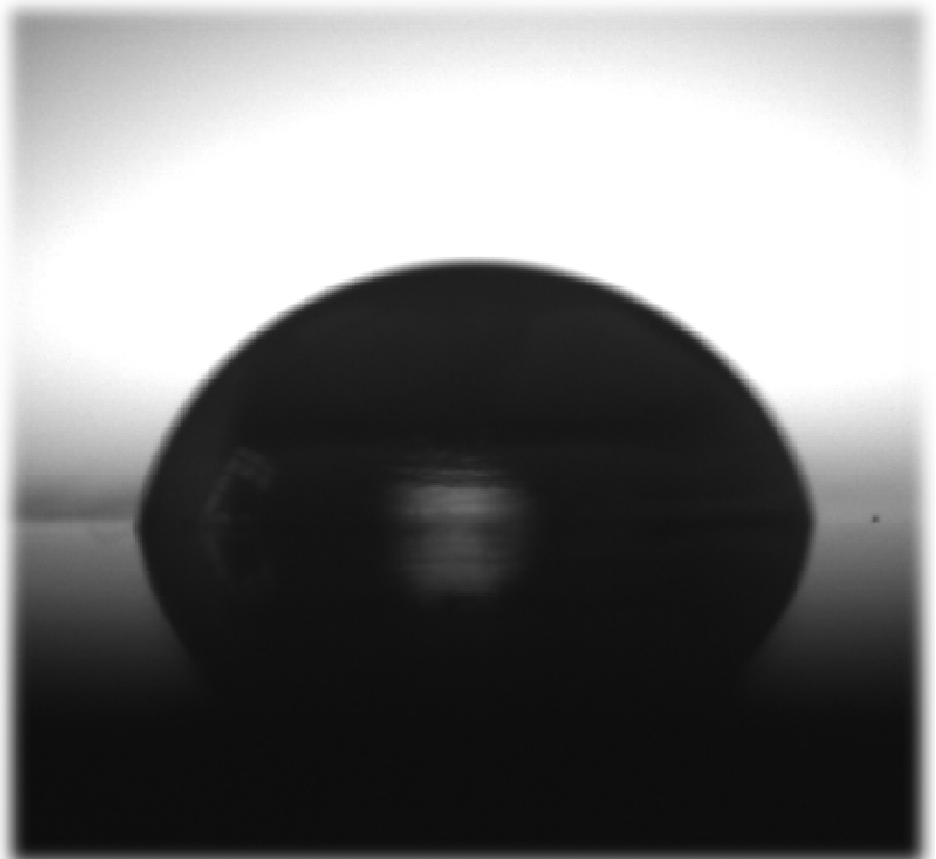
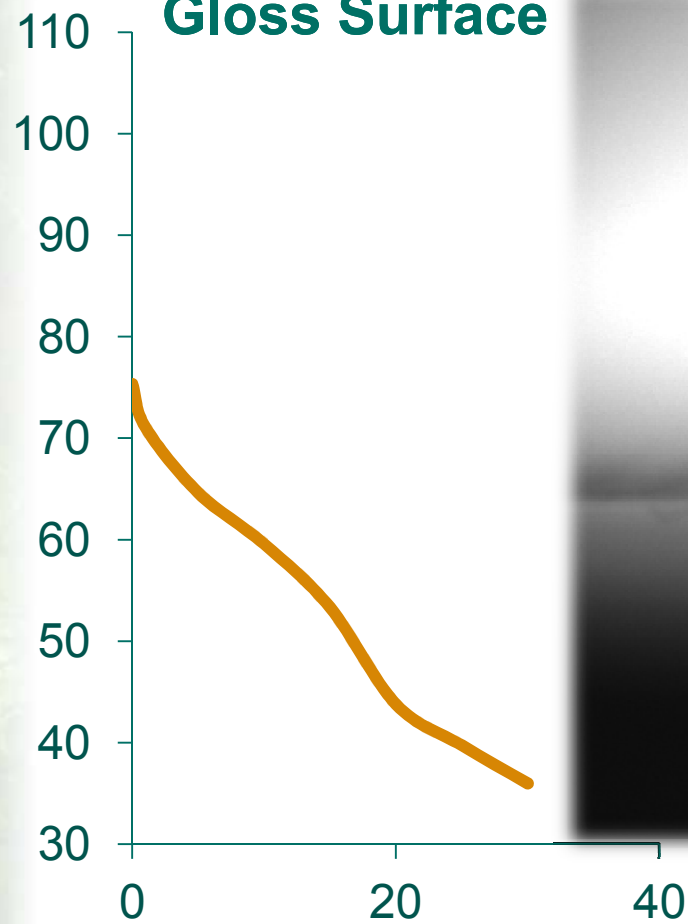
The larger the angle the
higher the Aversion





Hydrophobicity Measurements (1 of 3)

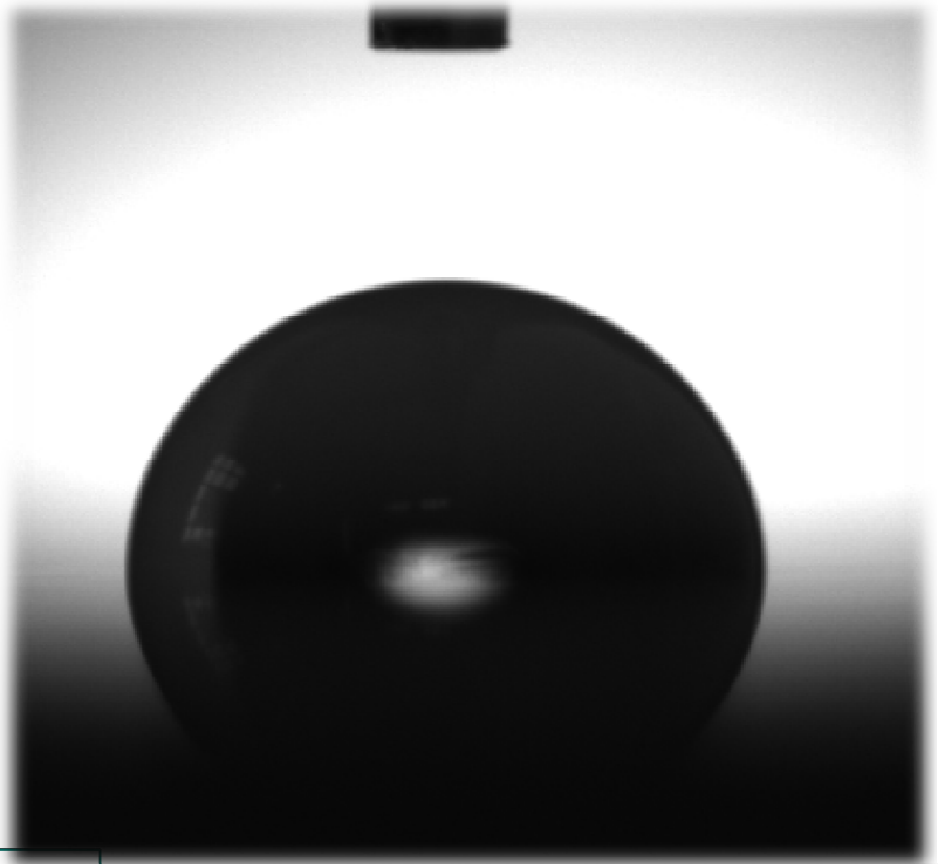
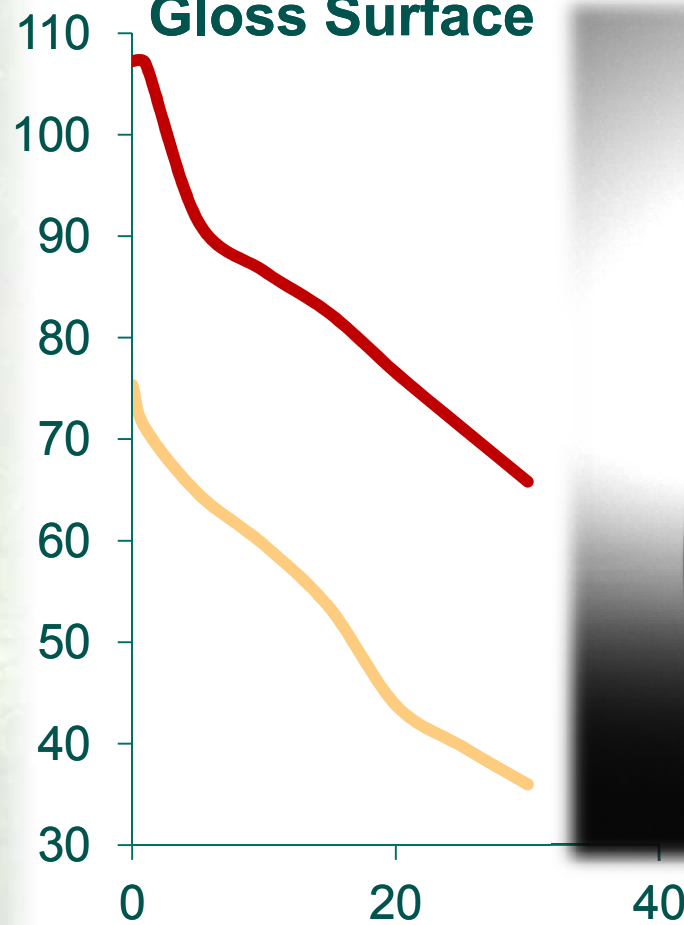
**Water on STD
Gloss Surface**





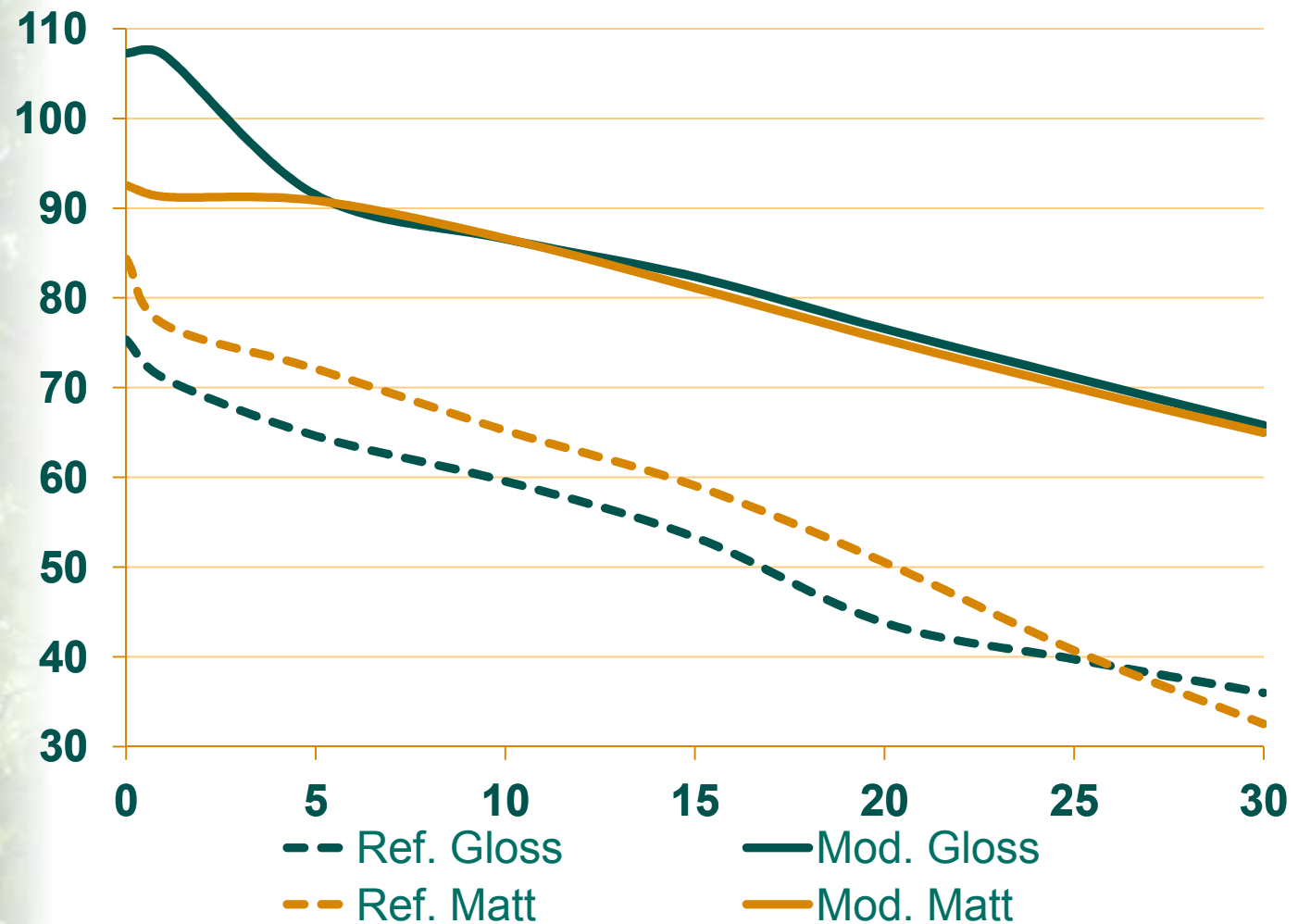
Hydrophobicity Measurements (2 of 3)

**Water on Modified
Gloss Surface**



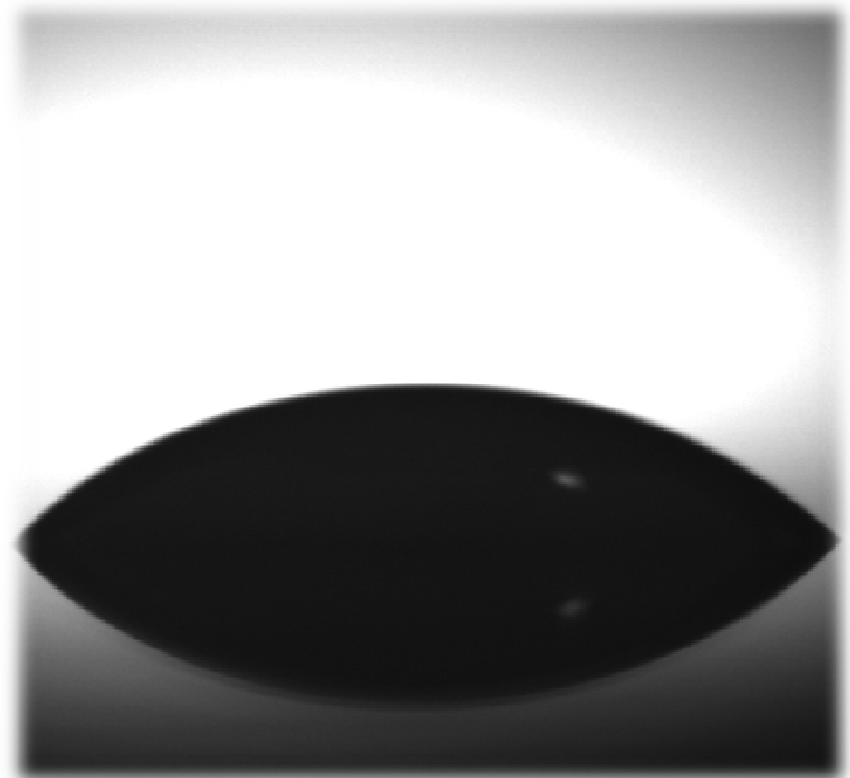
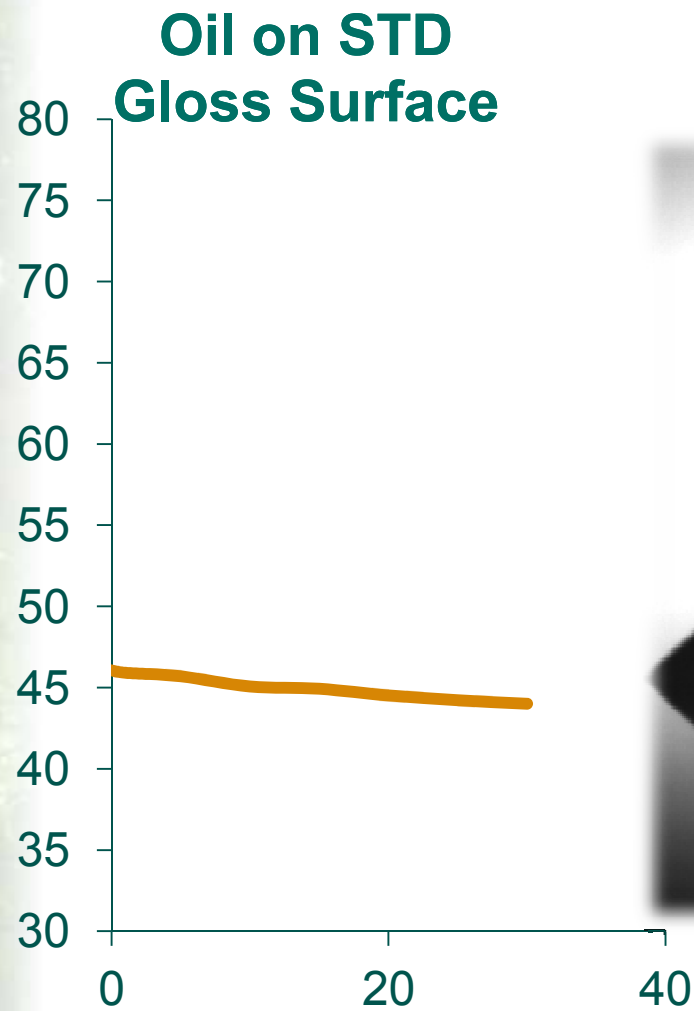


Hydrophobicity Measurements (3 of 3)



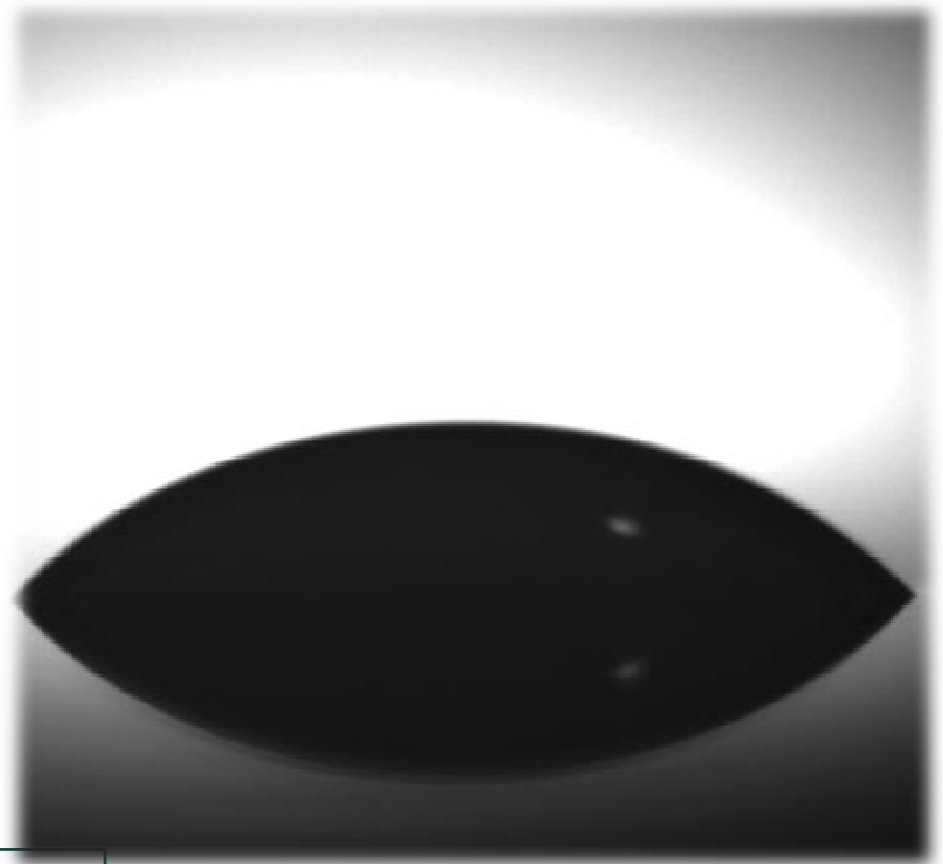
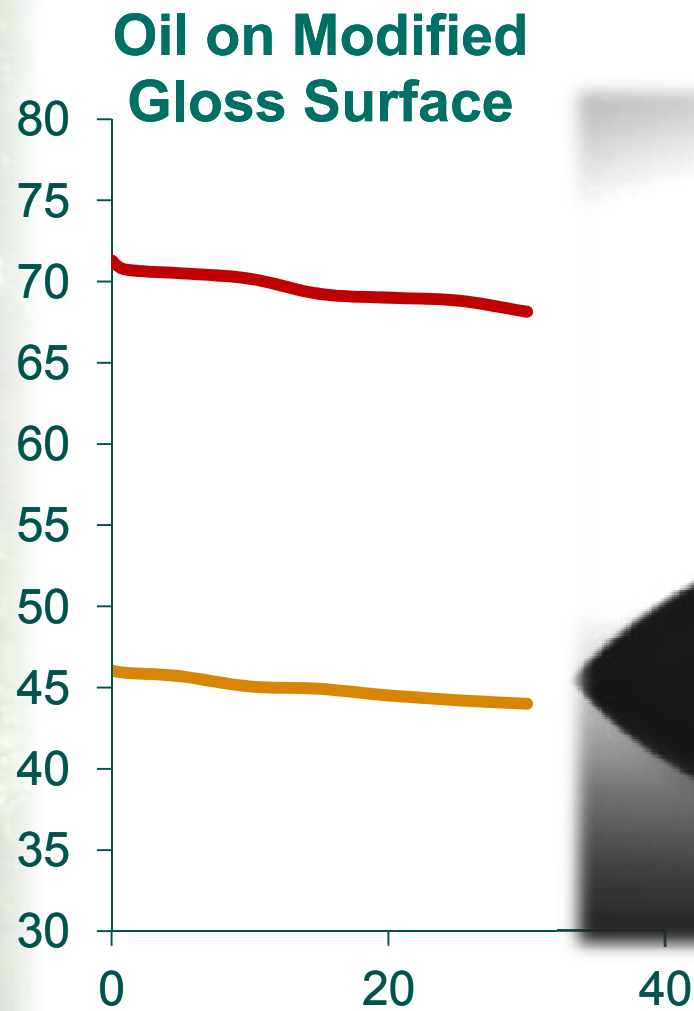


Oleophobicity Measurements (1 of 2)





Oleophobicity Measurements (2 of 2)





Form & Application

This new additive is in liquid, non-viscous form and is applied on impregnation lines with two ways:

Mixed in the 2nd bath

- Easy to introduce
- No modifications

Sprayed before the 2nd drying oven

- Better utilisation rate
- Minor changes required

The impregnated paper is applied on the substrate as standard high gloss paper,
without any changes required on the lamination line

Cost contribution is less than 4USD/m³ (7USD/MSF)



Benefits

For the End User

- Better aesthetics
- Less work required to maintain the surfaces clean
- More hygiene
- Less detergents used
- Longer lasting furniture

For the Producer

- Competitive edge
- No special handling
- Pioneering boards with minor (if any) investment
- Better Melamine Utilisation (under investigation)
- Added value production

For the Environment

- Less Water used
- Less detergents used
- Longer lasting furniture



CHIMAR in Figures

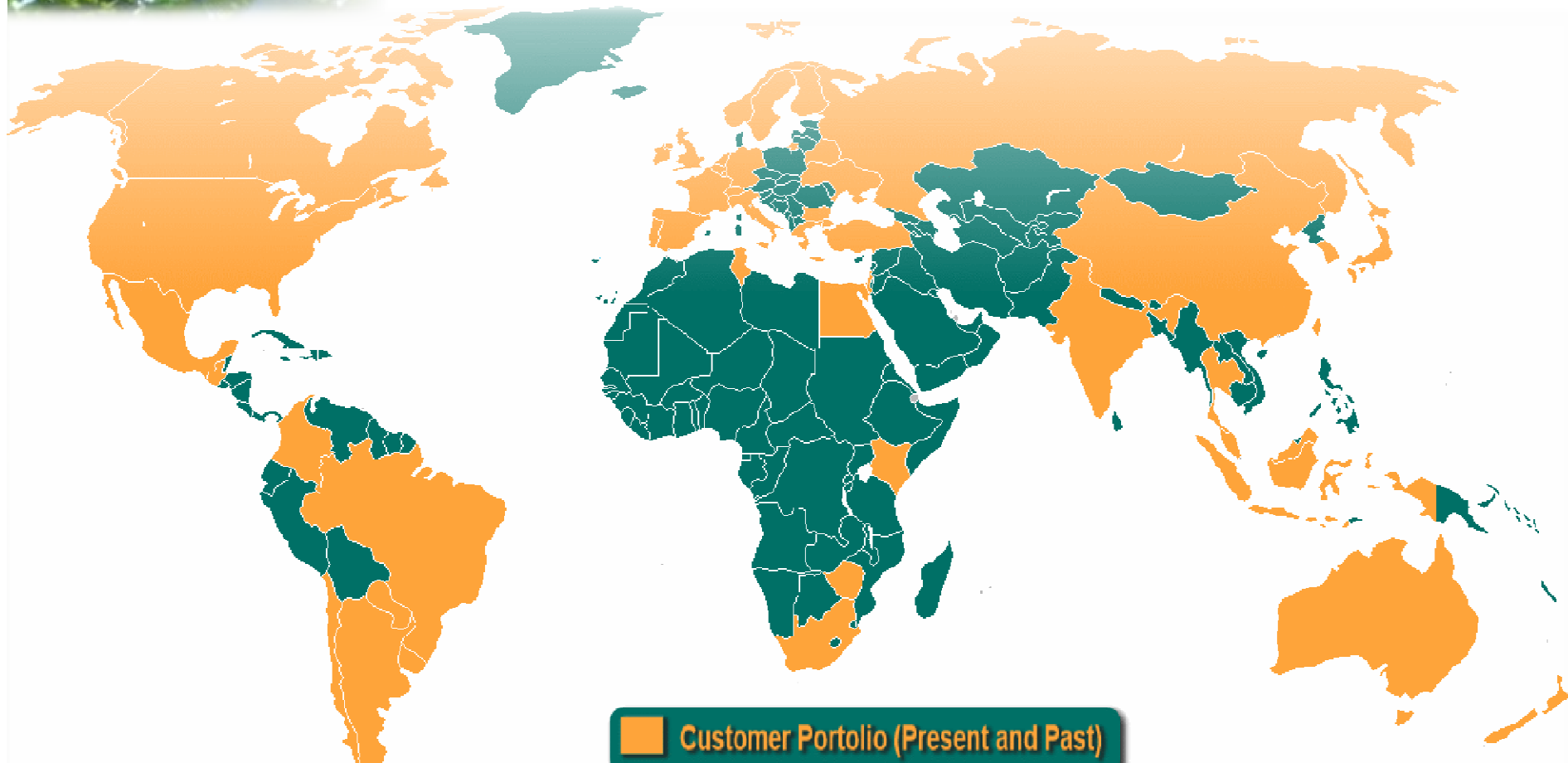
- ❖ **CHIMAR** expertise overreaches 37 years
- ❖ Technology applied in over 70 industrial plants located in 40 countries
- ❖ Annual resin capacity exceeds 1,000,000 tons following **CHIMAR's** know-how
- ❖ More than 15,000,000 m³ of panels are manufactured annually using the technology of **CHIMAR**
- ❖ 26-strong team (chemists, chemical/electrical & computer engineers, forest & wood scientists, petroleum technologists, finance and business administration)



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Licensing technology - 37 years in 40 countries





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For further Information please VISIT:

<http://www.chimarhellas.com/european-business-awards-2013-2014-chimar-hellas-national-champion-2>





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Thank You!

