



Advanced Nanocomposite material in Efficient Building

Michele Andolfo

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Facts and figures about Selena Group

- ▶ Established in **1992**
- ▶ **30** companies in **17** countries
- ▶ Sales to **70** countries worldwide
- ▶ **1700** employees
- ▶ **42 000** customers and **millions** of end-users all over the world
- ▶ One of **top three** manufacturers of one-component polyurethane foam in the world
- ▶ Sales of **PLN 1 bn (EUR 239 m)** in 2015



Listed on the Warsaw Stock
Exchange since 2008

AGNASIL –Description



- Development of acrylic and silicone sealants formulas with increased resistance to microbial corrosion.
- Formulas are based on aqueous nanosilver dispersion.
- The project is conducted with the cooperation TK Nano, Wrocław University of Technology and Wrocław University of Environmental and Life Sciences

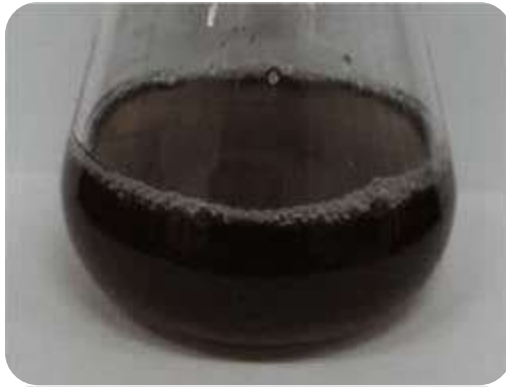
This work is supported by funds from The National Center for Research and Development Applied Research Programme (PBS)



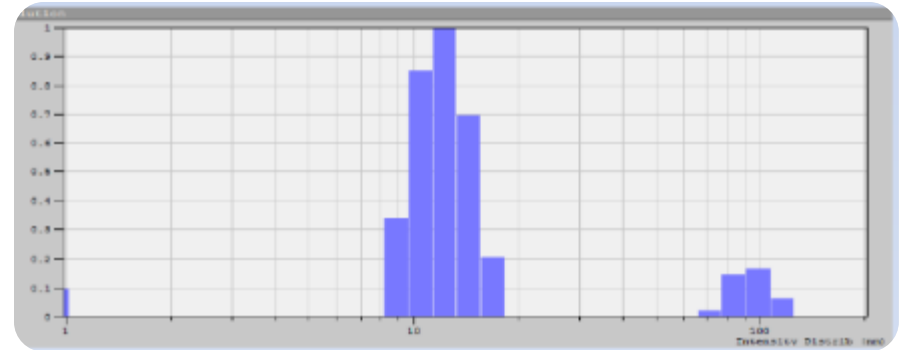
The National Centre
for Research and Development



Nanoparticle dispersion



Waterbase nanoparticles solution



DLS diagram of nanoparticle size

TECHNICAL DATA FOR ACRYLIC SEALANT	
Uncured - tested at 23 °C and 50% relative humidity value	
Density (ISO 2811-1) [g/ml]	1,03 ± 0,02
Skin forming time [min]	25 - 40
Tack free time [min]	40 - 50
Curing rate [mm/24h]	1 – 1,5
Cured - tested after 4 weeks at 23 °C and 50% relative humidity value	
Secant modulus (ISO 8339) [MPa]	N/A
Movement accommodation (ISO 9047)	12,5%
Elongation at break (ISO 8339) [%]	≥ 100
Elastic recovery (ISO 7389) [%]	≥25
Shore A hardness (ISO 868)	≥20



Testing and lifetime

Determining the action of mold fungi to polymers :

EN ISO 846 Plastics -Evaluation of the action of microorganisms

E2149 - 13a Standard Test Method for determining the Antimicrobial Activity of Antimicrobial Agents Under Dynamic Contact Conditions



Acrylic sealant



10 years RESISTANCE

Development of innovative lightweight and highly insulating energy efficient components and associated enabling materials for cost-effective retrofitting and new construction of curtain wall facades.



EENSULATE project

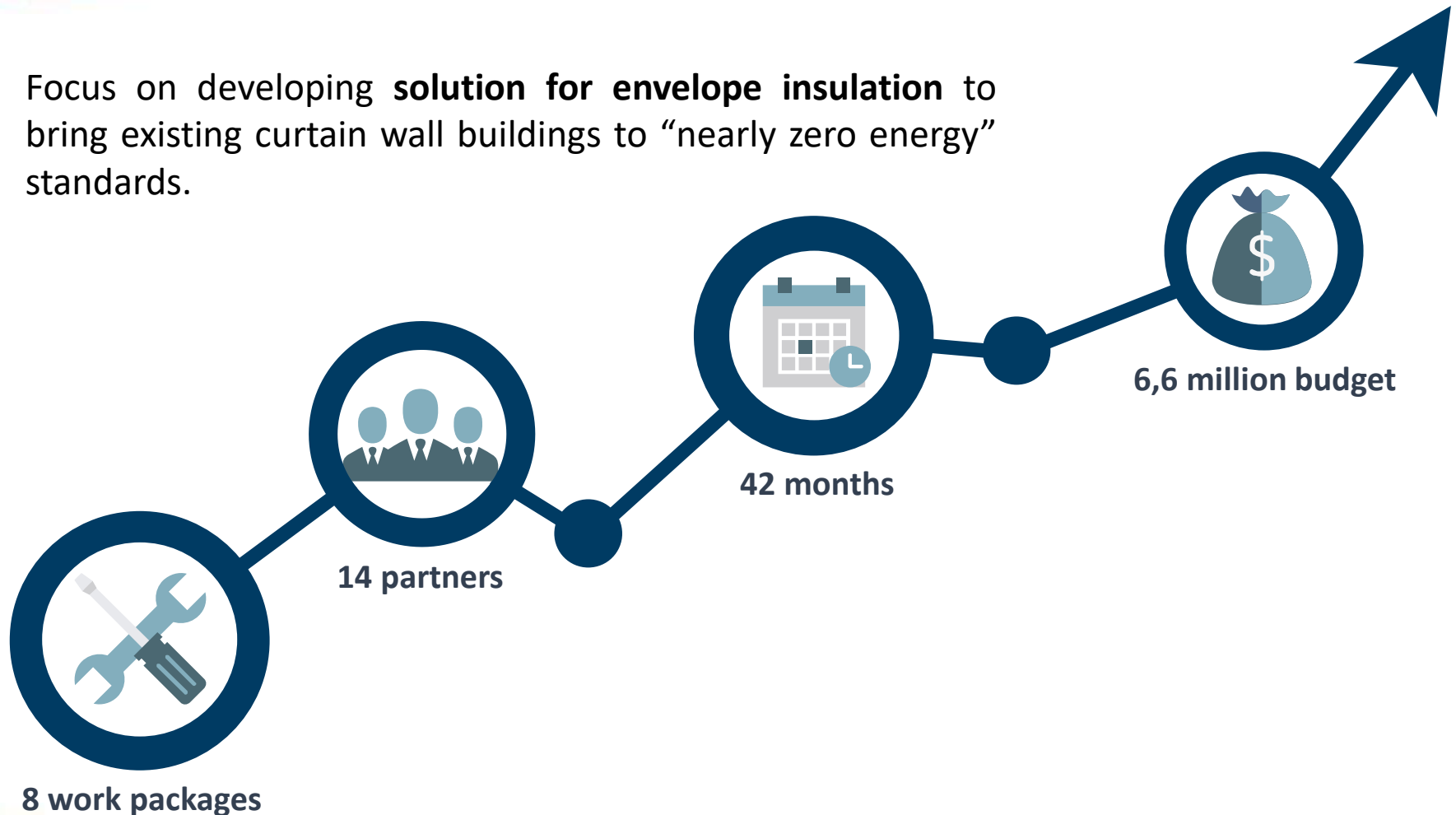
This project has received funding from European Union's Horizon H2020 research and innovation programme under grant agreement No. 723868.



EENSULATE PROJECT



Focus on developing **solution for envelope insulation** to bring existing curtain wall buildings to “nearly zero energy” standards.

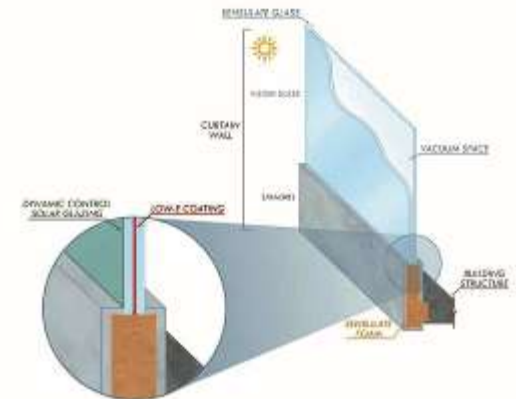
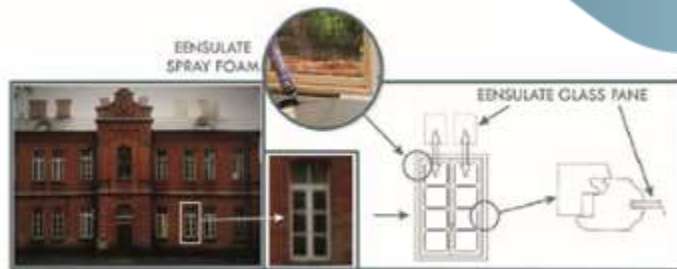


KEY PRODUCTS



➤ EENSULATE FOAM

Highly insulating foam for the cost-effective manufacturing and insulation of the opaque components of curtain walls.



➤ EENSULATE GLASS

A lightweight and thin double pane vacuum glass for the high insulation of the transparent component of curtain walls.

KEY PRODUCTS



> EENSULATE FOAM

Target properties

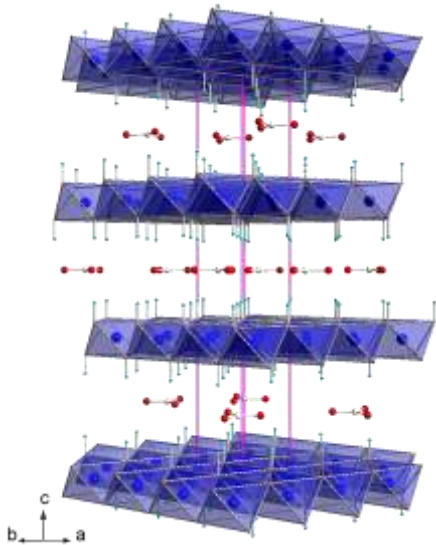
- Foam density: $\leq 45 \text{ Kg/m}^3$
- Thermal conductivity: $\leq 0,033 \text{ W/mK}$
- Fire resistance: EN13501 (class B-s1-d0)
- Sound adsorption comparable to benchmark
- Production time decreased, easier than previous system

KEY PRODUCTS



➤ EENSULATE FOAM

Lamellar powder in Polyurethane foams



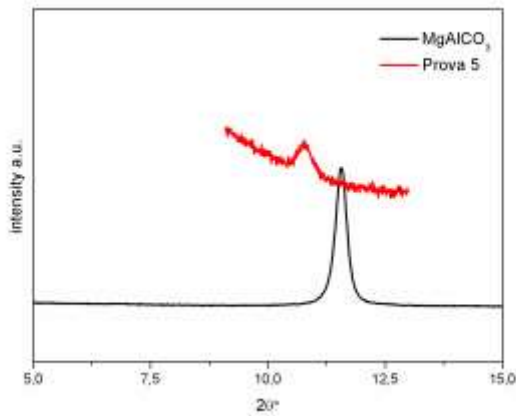
- Filler properties: improve fire resistance, Different host group: from carbonate group to organic molecule as possible compatibiizer.
- Foam will have all three physical action
 - Cooling
 - Char
 - Dilution of radicals

KEY PRODUCTS

> EENSULATE FOAM

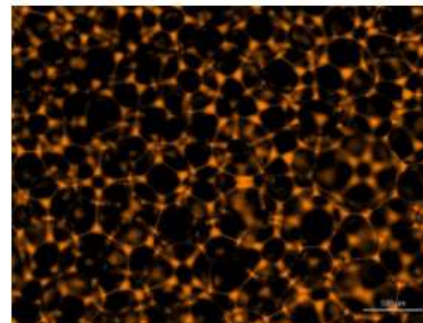
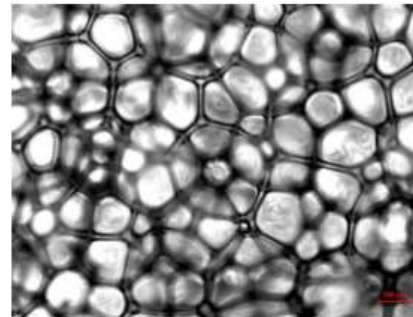
Characterization (Spectroscopy)

Morfology of filler inside of the foam: Intercalated

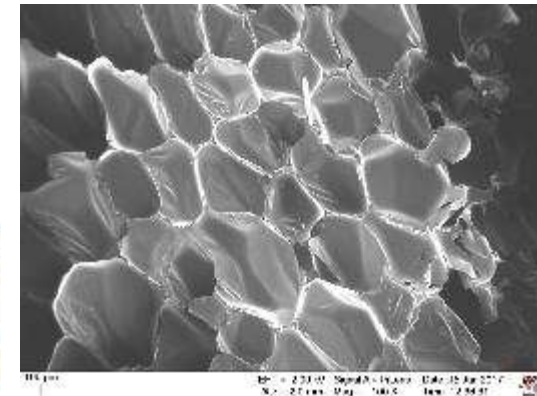


The presence of the (003) reflection in PU-LDH-CO₃ (sample 5) series at lower angle respect to that observed in the LDH-CO₃ denoted that a possible intercalated nanocomposite foam has been obtained [S. Gómez-Fernández et al. / Applied Clay Science 123 (2016) 109–120].

Confocal Microscope



Immagini SEM



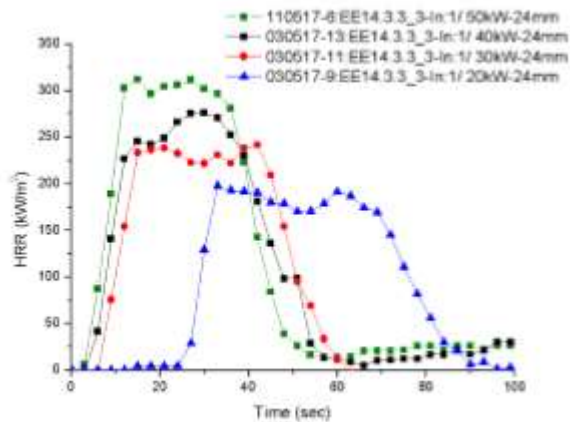
KEY PRODUCTS



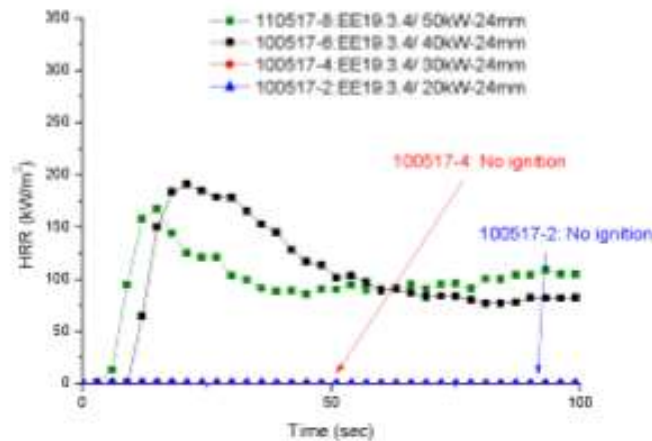
➤ EENSULATE FOAM

Target properties

In cooperation with
Ulster University



EE 19.3.4



In cooperation with
Evonik

Lambda value

0,0245 W/mK

KEY PRODUCTS



> EENSULATE FOAM

Properties at month 10

- Foam density: 34 Kg/m³
- Thermal conductivity: 0,0245 W/mK
- Fire resistance: Cone calorimeter ISO 5660 20-30 KW no ignition
- System can be easily used with standard PU technology

- 30-40% improvement in thermal efficiency
- The insulation element weight half
- Easier approach to design the facade



Thank you for your attention!
Questions are welcome

www.selena.com

Contact details:
Michele Andolfo
michele.andolfo@selena.com