



Pre-commercial lines for production of surface nanostructured antimicrobial and anti-biofilm textiles, medical devices and water treatment membranes



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THE GLOBAL CHALLENGE for **protect**

- High incidence of hospital-acquired infections.
- 3.000.000 people/year infected in the EU
- 50.000 people die
- €7 billion/year financial loss

Health care associated infections

- Antibiotics overuse
- Multidrug-resistant bacteria in the EU cause €1.5 billion/year financial loss

Antibiotic resistant bacteria



Microbial biofilms

- 80 % of all infections treated in hospitals are due to biofilms on indwelling medical devices

Unsafe water

- Waterborne diseases - among the major causes of preventable morbidity and mortality





CUSTOMERS, PROBLEM and EXISTING ALTERNATIVES

CUSTOMERS

manufacturers of antimicrobial and anti-biofilm textiles, medical devices, and water treatment membranes

PROBLEM

The customers do not dispose with efficient technologies to manufacture these products with high-quality and durability

EXISTING ALTERNATIVES

High energy consuming and inefficient coating processes, resulting in low durability of the antimicrobial and anti-biofilm effect.





Cost effective, sustainable and reliable nano-coating production lines that enable customers to create high-quality anti-biofilm, antimicrobial and biocompatible nano-coated products with longer lifetime than competing products at a fraction of the price.



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The logo for 'protect' features the word in a grey, lowercase, sans-serif font. To its right is a grey pentagonal shape with three orange circles at its vertices.

protect **UNIQUE VALUE PROPOSITION**

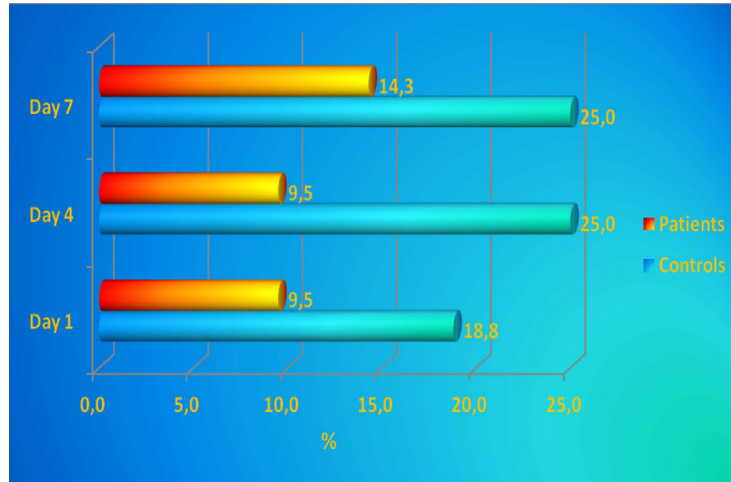
- **Patent-protected technologies**
- **Versatile coating processes employing ultrasound** adaptable for any active agent, coated material and product shape.
- **A single step nano-functionalisation** with novel efficient **nano-antimicrobials**
- **In-situ synthesis and coating with nano-antimicrobials**
- Integrated **real-time monitoring tools** for nanotechnology-based processes and products.
- **Ease of integration** of the new technologies in existing manufacturing facilities.
- **Low manufacturing costs**



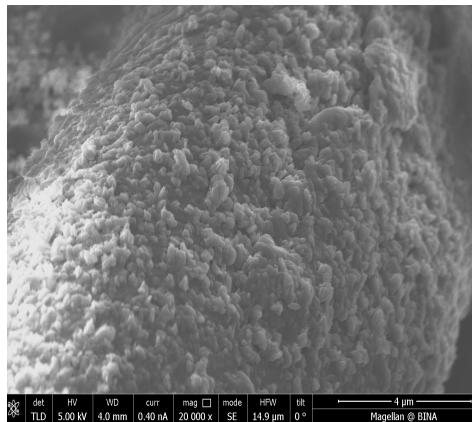
protect VALIDATION



ZnO-coated patients' gowns

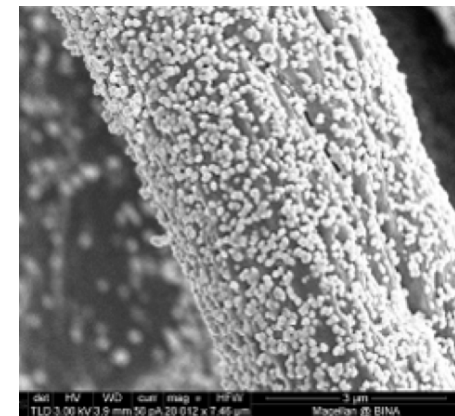
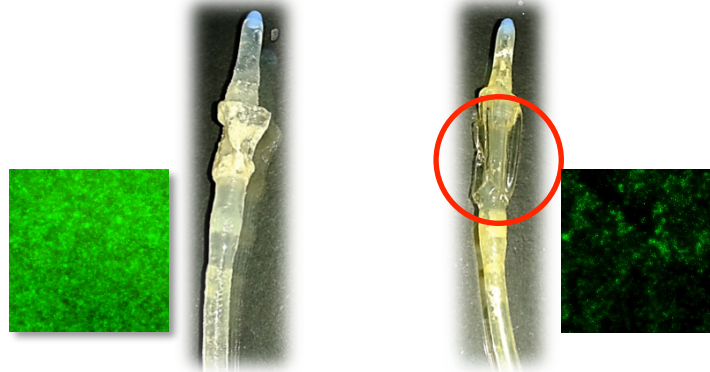


Lower level of bacterial infection in “antibacterial” patients than the “regular” ones.
(Clinical study with 37 patients)



Hybrid NPs:
ZnO/tannic acid/enzyme

70 % biofilm inhibition *in-vivo*



Inorganic NPs:
ZnO, CuO, Zn-CuO, MgF₂



Total Addressable Market – manufacturers of functional materials used in textile and clothing industries, transportation, construction, healthcare, food packaging and water treatment.

Serviced Available Market – manufacturers of antimicrobial and anti-biofilm textiles, medical devices and water filters *produced by conventional technologies*

Target Market – manufacturers of antimicrobial and anti-biofilm hospital textiles, catheters and water treatment membranes



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 **THE MARKET OF HOSPITAL BED LINEN**

- About 2.000.000 hospital beds available in EU for acute diseases with an occupation rate of 75% and an average of 4 days hospitalisation.
- Need for about 3 millions sets of hospital bed sheets
- €15 millions/year market value for new bed sheets
- €3-4 billions/year bed sheets maintenance market
- 47 suppliers of hospital sheets in EU



A. The antimicrobial treatment as a service

Manufacturer of bed sheet buying the antibacterial treatment (service) from a partner with pilot unit through inter-partners agreements for exploitation

Preliminary financial plan for high quality bed sheets 5 years after the end of PROTECT project						
Time period of forecast		Year 1	Year 2	Year 3	Year 4	Year 5
forecast sales	Bed sheets (*) Quantities	4.168,02	10.420,04	20.840,09	31.260,13	37.512,16
	Revenues (€) **	166.721	416.802	833.604	1.250.405	1.500.486
prototype unit	unit cost of finishing (****)	3,87	3,71	3,55	2,69	2,49
total Manufacturing Direct Costs (€)		11.757	29.393	58.786	88.179	105.815
Cost for finishing (€)		16.127	38.639	73.917	84.243	93.510
Total Direct Costs (€)		27.885	68.032	132.703	172.422	199.324
Total Indirect costs(€)		5000	7.500	10000	12.500	15000
Gross Profit (€)		133.836	341.270	690.900	1.065.484	1.286.162
Investment in Fixed Assets (manufacturing) (€) ***		15.000	15.000	15.000	15.000	15.000
Net profit		118.836	326.270	675.900	1.050.484	1.271.162
(*) high quality bed sheets with special design and colours, suitable for clinics and also for wellness centers						
(**) Price per unit 40€						
(***) Investments for improvement of looms productivity and confexion capacity enhancement						
****) functionalisation is carried out by US R2R pilot by minimal charge according to project partner internal agreements for exploitation						

B. Internalisation, verticalisation and total control of the value chain by one entity purchasing a pilot

Manufacturer with pilot unit producing and selling bed sheets

Preliminary financial plan for high quality bed sheets 5 years after the end of PROTECT project						
Time period of forecast		Year 1	Year 2	Year 3	Year 4	Year 5
forecast sales	Bed sheets (*) Quantities	4.168,02	10.420,04	20.840,09	31.260,13	37.512,16
	Revenues (€) **	166.721	416.802	833.604	1.250.405	1.500.486
prototype unit	unit cost of finishing	9,41	4,46	2,66	2,11	1,92
total Manufacturing Direct Costs (€)		11.757	29.393	58.786	88.179	105.815
Cost for finishing (€)		39.225	46.463	55.358	65.837	72.125
Total Direct Costs (€)		50.982	75.856	114.143	154.016	177.939
Total Indirect costs(€)		5000	7.500	10000	12.500	15000
Gross Profit (€)		110.738	333.446	709.460	1.083.890	1.307.547
Investment in Fixed Assets (manufacturing) (€) ***		40.000	40.000	40.000	40.000	40.000
Net profit		70.738	293.446	669.460	1.043.890	1.267.547
(*) high quality bed sheets with special design annd colours, suitable for clinics and also for wellness centers						
(**) Price per unit 40€						
(***) Investments for internalisation of the process by acquiring a functionalisation unit with estimated value of 200k€						

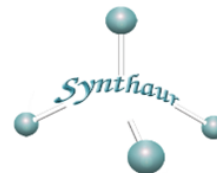
The logo features the word "protect" in a grey, lowercase, sans-serif font. To its right, the word "TARGETS" is written in a bold, orange, uppercase, sans-serif font. A grey line connects the two words, starting from the top of "protect", going right, then down, then right again, ending at the top of "TARGETS". Three small orange circles are placed at the top-left, bottom-left, and top-right corners of this line.

- 8 % total market share in 5 years by addressing clinics, hospitals and wellness centres with **high quality low-medium production volume**.
- 30 % market share in 5 years by **large volumes production**. Investments to acquire 8 pilots or to intensify the existing ones.
- Expand the business model to **hotels and elderly care centres**.





70 % industry participation + highly innovative technology providers = commitment for success





protect STATE-OF-THE-ART AND FUTURE ACTIVITIES

Validated technologies:

- **Three nano-particle coating pilots** operating in real conditions

Future activities:

- **Scale-up of the pilots** to industrial production standards
- Integration in the pilots of **real time process and product monitoring tools**



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Potential users of the nano-coating sonochemical technology are invited to **test the coating lines for specific products.**

The manufacturers will be assisted to **evaluate both the technology and the functionality of the end products.**

Different business scenarios will be suggested - acquisition of the nano-coating machines or their use as an external service.



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