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

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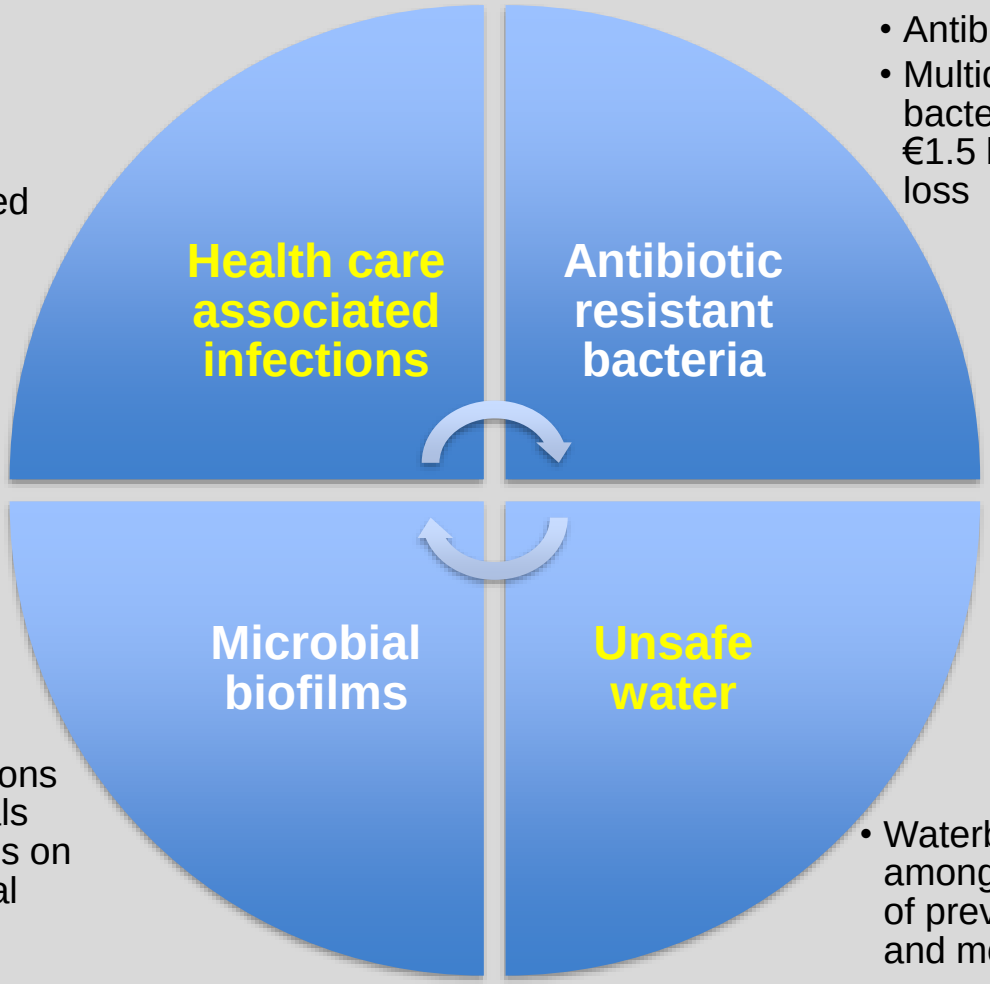
THE GLOBAL CHALLENGE for protect

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



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

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

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

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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.

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SOLUTION

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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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**

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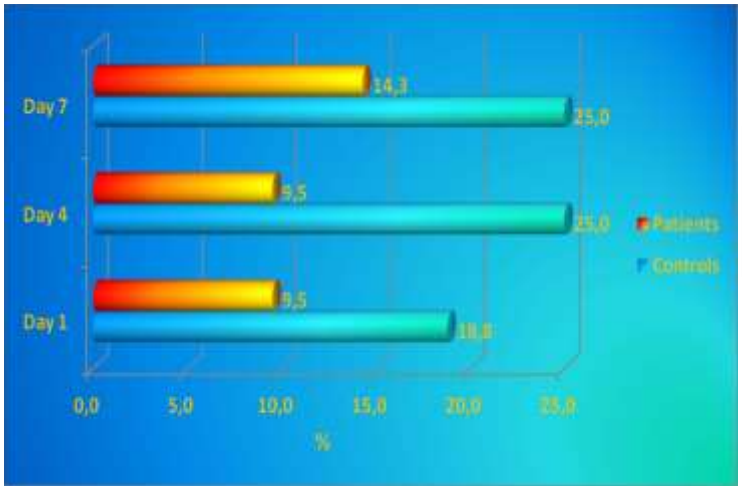
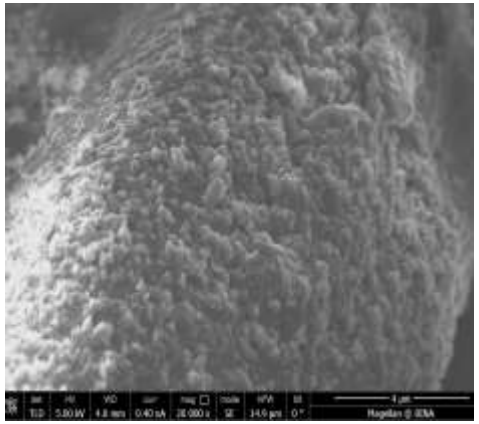
VALIDATION

ZnO-coated patients' gowns



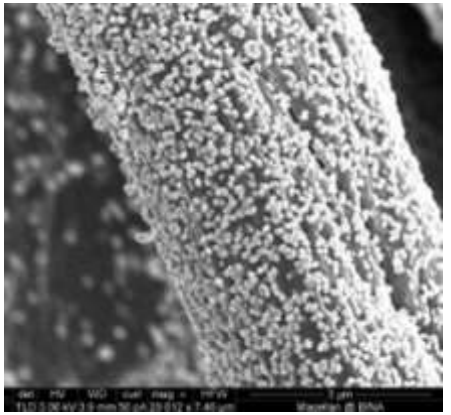
Lower level of bacterial infection in "antibacterial" patients than the "regular" ones.

(Clinical study with 37 patients)



Hybrid NPs:
ZnO/tannic acid/enzyme

70 % biofilm inhibition *in-vivo*



Inorganic NPs:
ZnO, CuO, Zn-CuO, MgF_2

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MARKETS

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

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FINANCIAL PLAN

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 annd colours, suitable for clinics and also for wellness centers

(**) Price per unit 40€

(***) Investments for improvement of looms productivity and confection capacity enhancement

(****) functionalisation is carried out by US R2R pilot by minimal charge according to project partner internal agreements for exploitation

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FINANCIAL PLAN

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€

TARGETS

- 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**.

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protect TEAM

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

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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CALL TO ACTION

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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