



Eco-friendly water and oil repellent and antimicrobial finishes on textiles

De Smet David – Centexbel
dds@centexbel.be



Outline

GoToS3
DURATEX

- Introduction
- Results
- Conclusions and outlook

Outline

- Introduction
- Results
- Conclusions and outlook

Centexbel/VKC

- Collective research and technical centre
 - Governed by the industry
- Membership organisation
 - Belgian textile companies
 - Associated (international) member companies and organisations

Centexbel/VKC

GoToS3
DURATEX

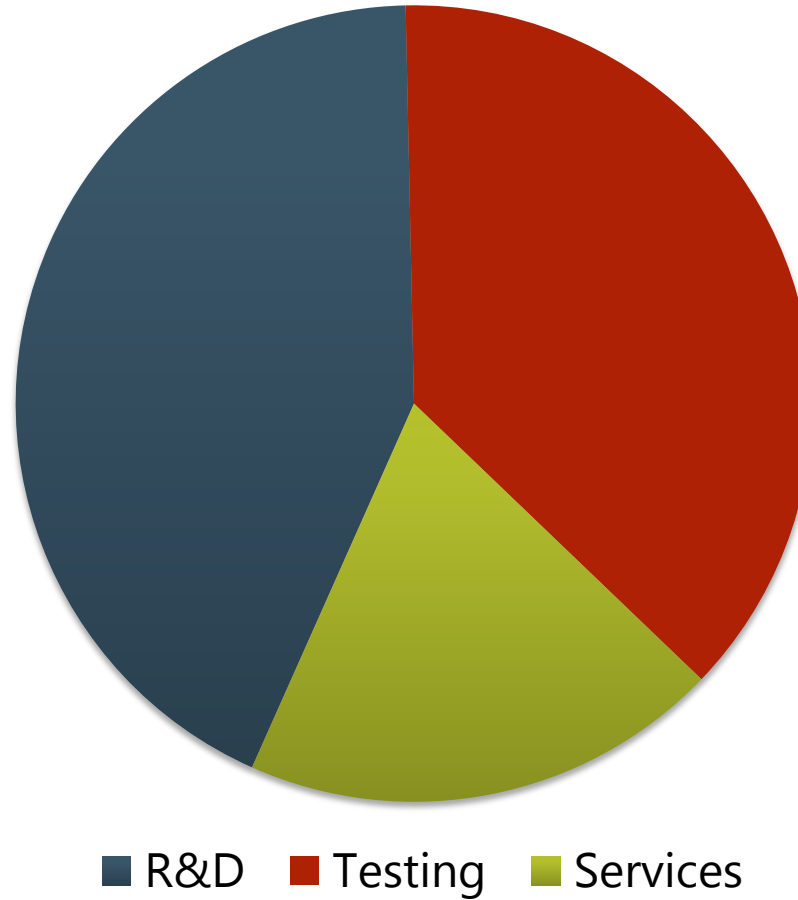


Istanbul



Products & Activities

GoToS3
DURATEX

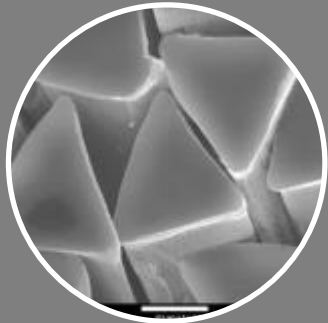


■ R&D ■ Testing ■ Services



Technology Fields

GoToS3
DURATEX



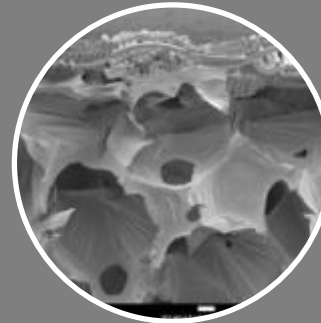
Functional thermoplastic textiles

- Meltprocessing of polymers in textiles and composites



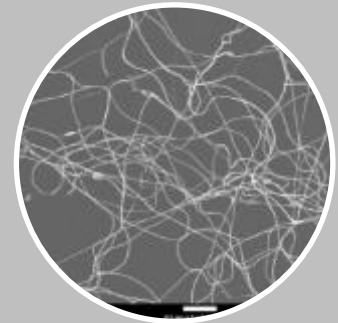
Plastic processing

- Material characterisation
- Plastic processing technologies
- Recycling



Textile functionalisation and surface modification

- Coating, finishing and surface modification for new and superior functional performances



Health, safety and security

- Textile products for health, safety and security purposes

Research Strategy

- Close to industrial needs and opportunities
 - innovation in processes
 - innovation in products
- Sustainability
 - resource efficiency
 - recycling of materials
 - biopolymers (industrial implementation)

Duratex

- Interreg V France-Wallonie-Flanders project
- Objective
 - Eco-friendly water and oil repellent
 - Non-toxic biobased antimicrobials free of metals
 - Extrusion
 - Diffusion
 - Coating and finishing
- Transborder cooperation

Duratex partners

- Centexbel
- Certech
- UCL
- Ceti
- Ensait

Outline

GoToS3
DURATEX

- Introduction
- Results
- Conclusions and outlook

Superhydrophobic surfaces

- Most important characteristics
 - Micro and nano roughness
 - Low surface tension
 - Contact angle $> 150^\circ$
 - Water drop rolling off

Solgel route

- PES treated with tetraethyl orthosilicate (TEOS) and octyltriethoxysilane

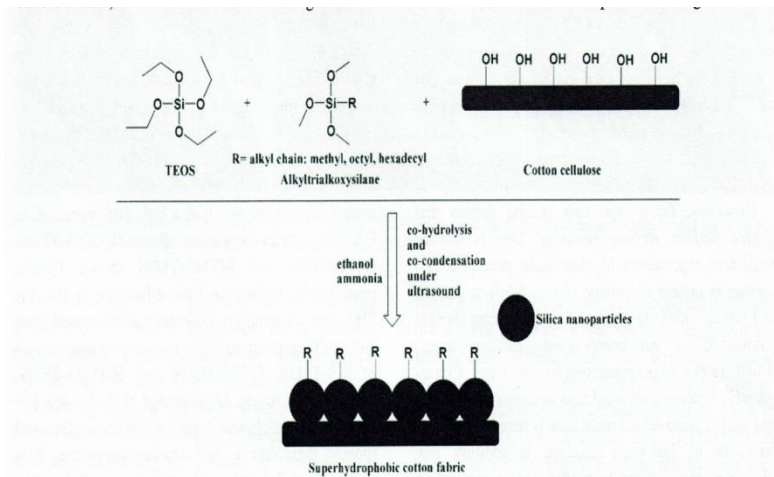
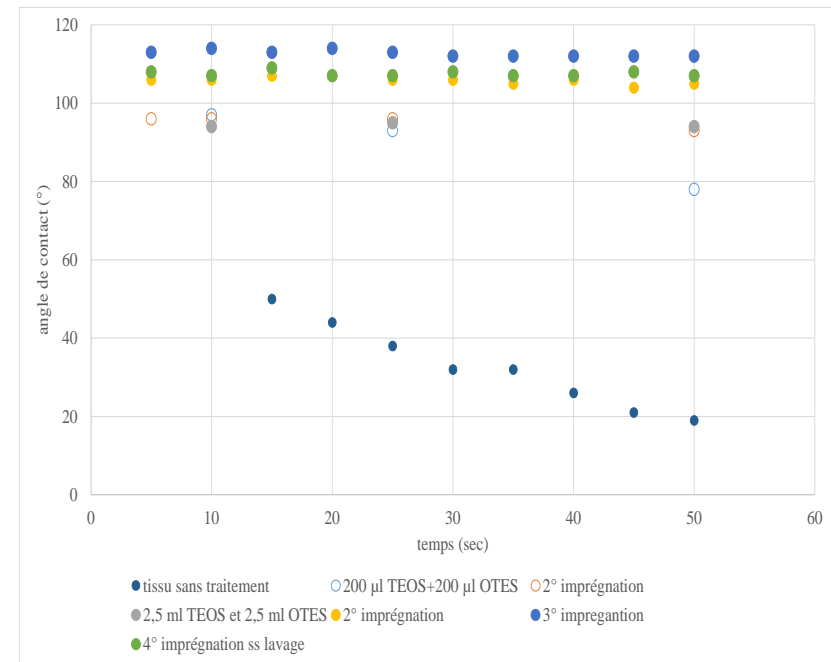


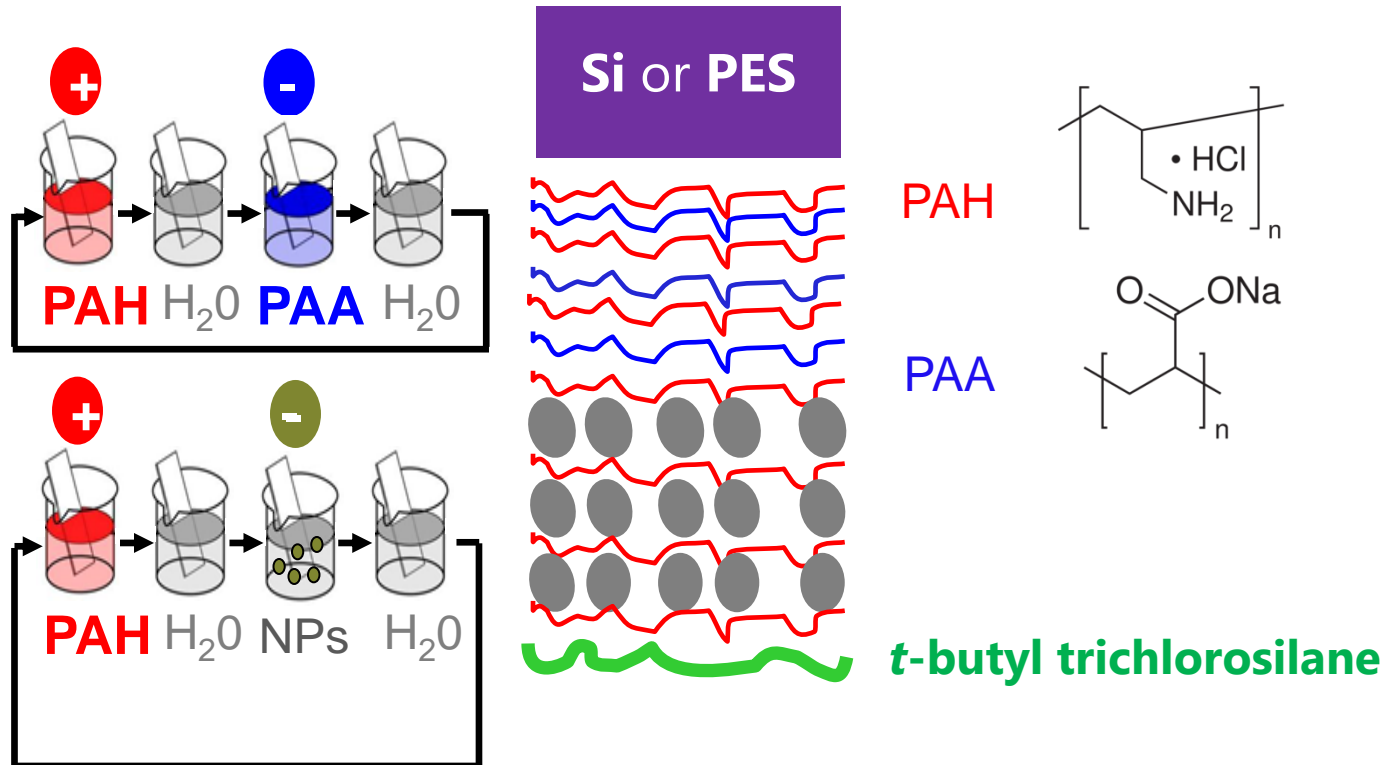
Fig. 1 Schematic illustration of chemical structures and coating procedure for fabrication of superhydrophobic cotton fabric

Springer



- No superhydrophobic effect

LbL route

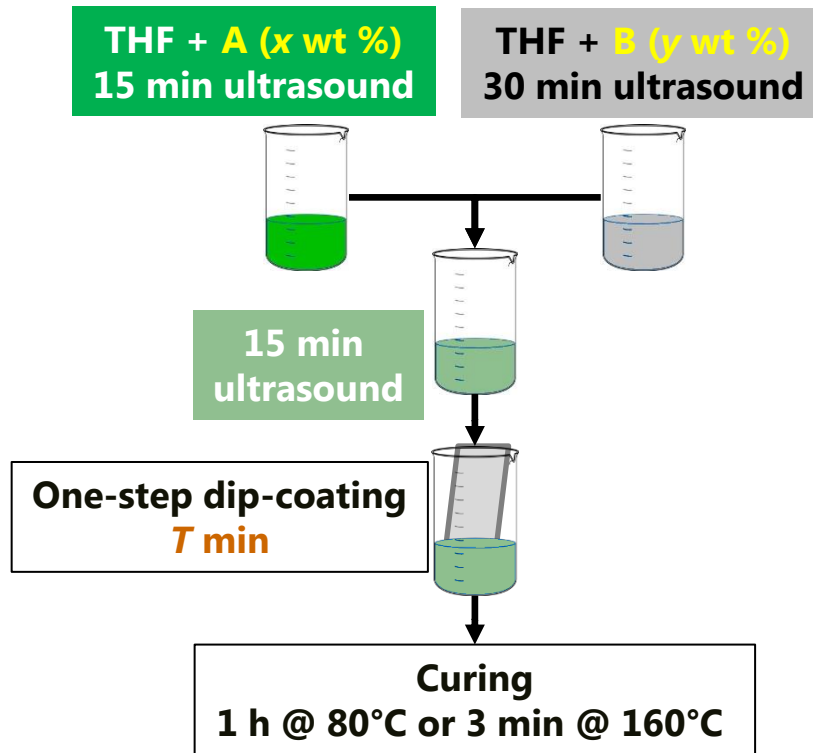


- No superhydrophobic effect and time consuming

	Contact angle (°)
Si	151-153
PES	139-144

New route

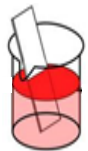
GoToS3
DURATEX



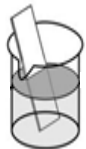
A (x wt %) - B (Y = 1.5 wt %)					
A	0.5%	1%	2%	4%	6%
(°)	130.5°	139°	Roll-off ++	Roll-off ++	Roll-off ++
				++	
A (x = 2 wt %) - B (y wt %)					
B	0.5%	1%	1.5%	2%	
(°)	Roll-off +/-	Roll-off +	Roll-off ++	Roll-off +/-	

New route (waterbased)

Suspension/emulsion preparation



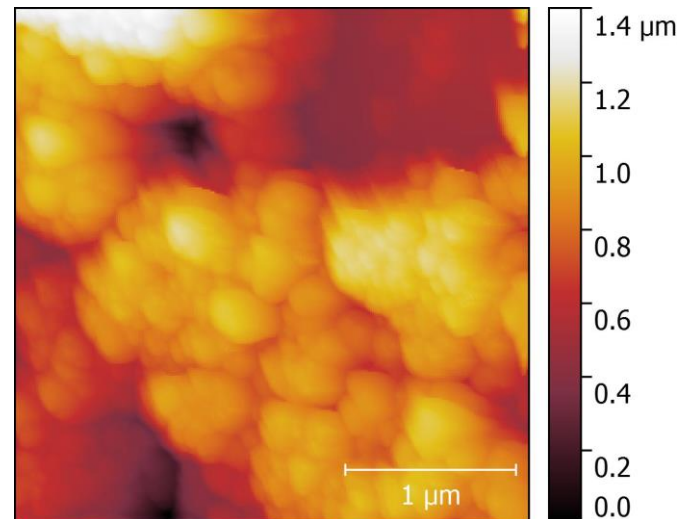
A 1 wt% in water



B suspension
 $x = 0.5$ or 0.75 wt%

A 1 wt%, B x wt%

x	0.5	0.75
Contact angle (°)	140-147	Roll-off



$$R_{\text{rms}} = 223 \text{ nm}$$

$$A_s = A_{\text{developed}}/A_{\text{projected}} = 1.8$$

Antimicrobial formulation

- Selecting biobased antimicrobial products:
 - Commercial availability
 - Toxicity
 - Cost price
 - Odour
 - Compatibility
 - Metal free

Biobased antimicrobials

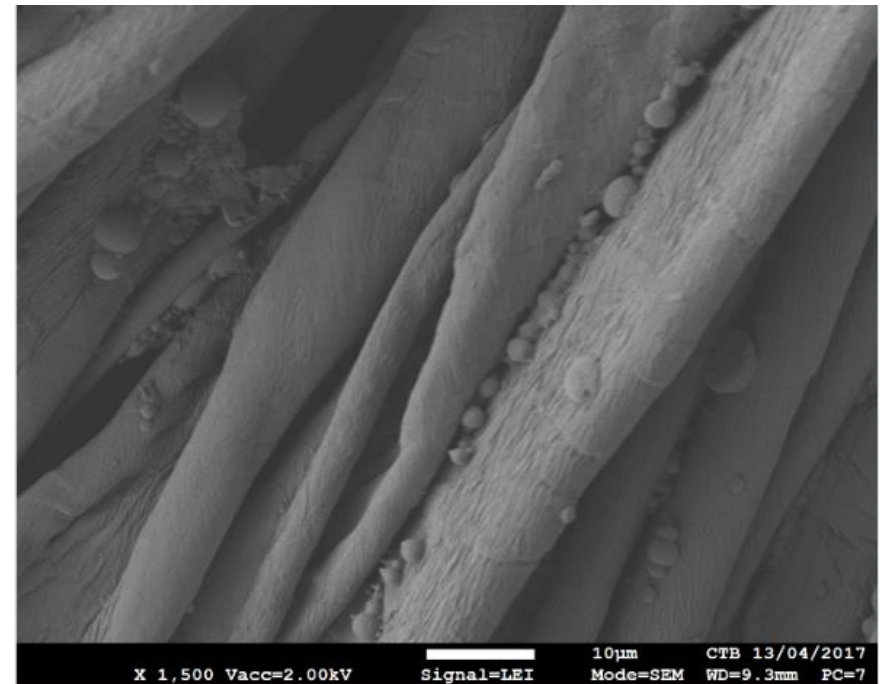
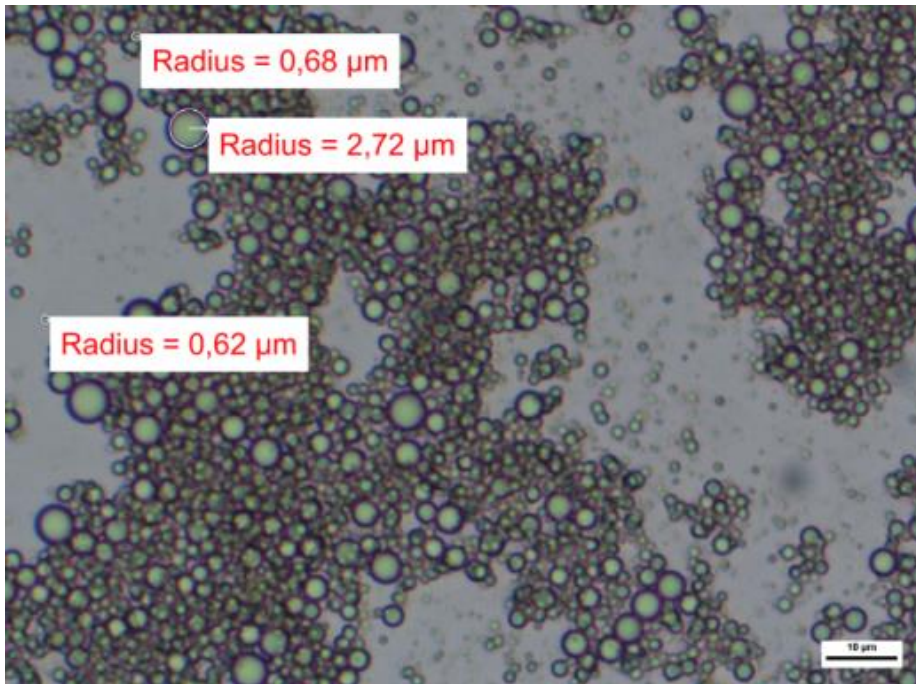
- Antibacterial effect of biobased products assessed
- Kemnat, tannic acid and monolaurin were antibacterial
- Thymol + carvacrol strong antibacterial mixture but strong odour
- Type of fabric had strong influence on antibacterial effect

Micro encapsulation

- PU-urea microcapsules
- Biobased and non-toxic products
- Encapsulating grapefruit oil and citronellal
- Core material should not contain reactive hydroxyl groups

Micro encapsulation

GoToS3
DURATEX



Micro encapsulation

- Applied on cotton woven and knitted fabric and PES woven fabric
 - Cotton: antibacterial effect towards *S. aureus* and *E. coli*
 - PES: antibacterial effect towards *S. aureus*

Outline

GoToS3
DURATEX

- Introduction
- Results
- Conclusions and outlook

Conclusions

- Superhydrophobic effect is achieved with fluor free products
 - Application via foulard
- Non-toxic biobased products exhibited antibacterial effect towards Gram+ and Gram-bacteria
 - Application via diffusion or foulard

Outlook

- Kick-off of Duratex project
 - @ Centexbel (Zwijnaarde)
 - October 16, 13h30

- Free registration via website
<http://www.centexbel.be/agenda/duratex-kick-off>

Acknowledgement

Projet soutenu par
Project ondersteund door

Interreg
France-Wallonie-Vlaanderen



UNION EUROPÉENNE
EUROPESE UNIE



Recherche et innovation
Onderzoek en innovatie

Plus d'infos
Meer info

www.interreg-fwvl.eu
@InterregFWVL

Avec le soutien du Fonds européen de développement régional
Met steun van het Europees Fonds voor Regionale Ontwikkeling

