IOCM 2025 Conference
The 4th International Online Conference on Materials
3–6 November 2025 | Online
MDPI

NATURAL BIOPOLYMER-BASED MICROCAPSULES AS SUSTAINABLE AGENTS FOR HYDROPHOBIC TEXTILES

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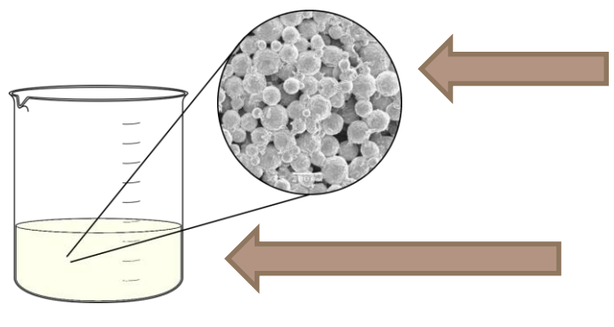
INTRODUCTION & AIM

Per- and polyfluoroalkyl substances (PFAS) provide textile water repellency but pose environmental and health risks. This study explores natural biopolymer-based microcapsules (MC) as sustainable, biodegradable alternative to achieve durable textile hydrophobicity without fluorinated compounds.

METHODS

Coating formulations



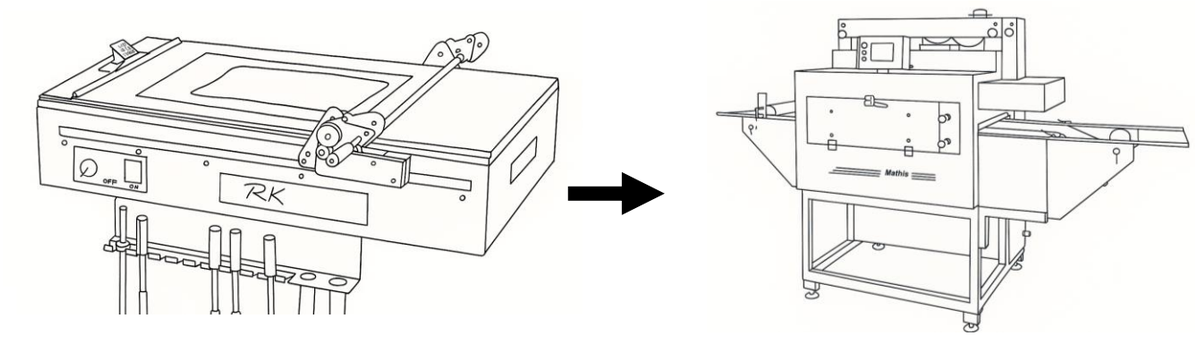
A combination of natural biopolymers

Coating solution containing suspensions of microcapsules

6 formulations with different concentrations of reagents:

No.	Components	Abbrev.
1	Suspension of MC (c1) in polysaccharide matrix	MC1
2	Suspension of MC (c2) polysaccharide matrix	MC2
3	Suspension of MC (c1) in polysaccharide matrix + crosslinker (c1)	MC1C1
4	Suspension of MC (c1) in polysaccharide matrix + crosslinker (c2)	MC1C2
5	Suspension of MC (c2) in polysaccharide matrix + crosslinker (c1)	MC2C1
6	Suspension of MC (c2) in polysaccharide matrix + crosslinker (c2)	MC2C2

Application process

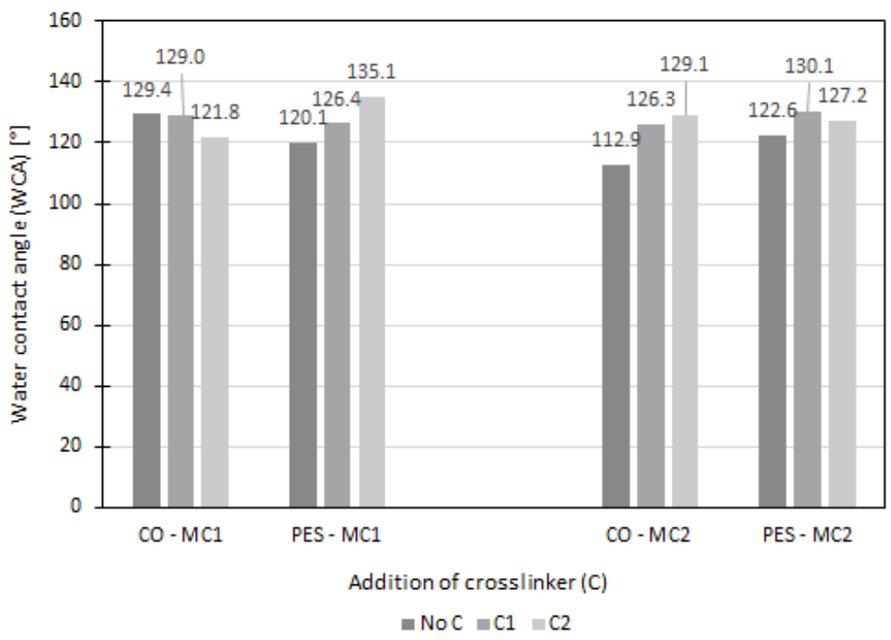


Rod-coating on CO and PES textiles

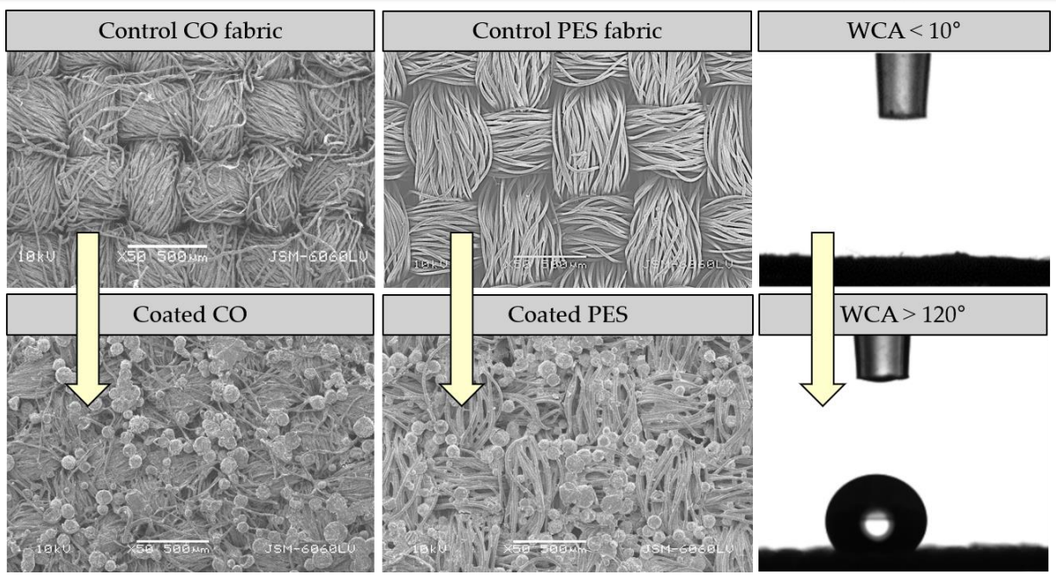
Drying in a laboratory dryer

RESULTS

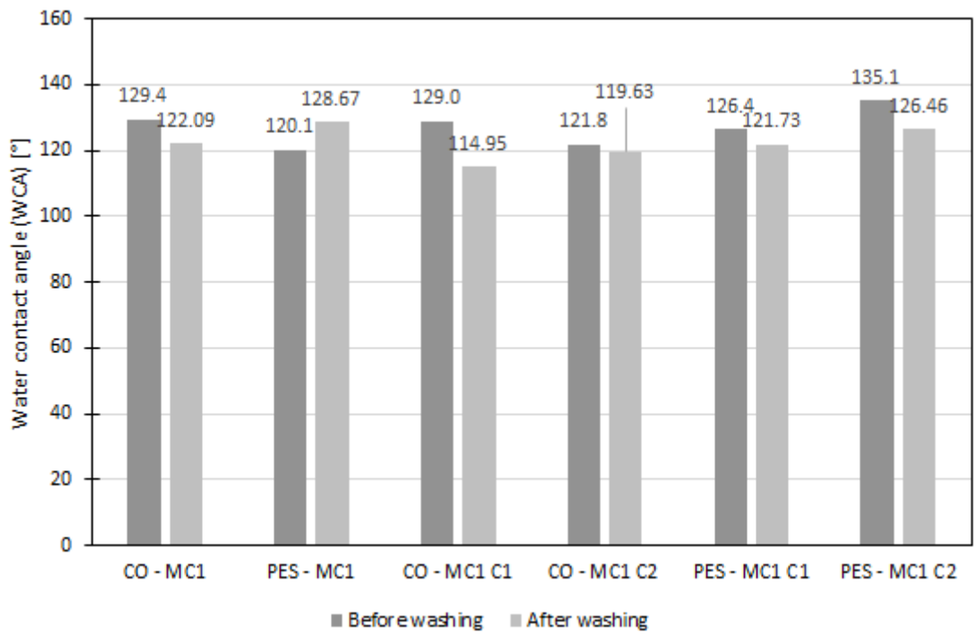
WCA of MC-coating with or without crosslinking agent:



SEM and WCA images before/after coating application:



Durability to washing:



CONCLUSIONS

- Before washing, no significant differences in WCA are observed between samples with or without crosslinker (C), all samples exhibit strong hydrophobicity.
- Different concentrations of MC did not lead to an increase in WCA.
- After washing, a slight decrease in WCA was observed for all samples, regardless of the presence of C.
- The only exception was the PES sample without C, which showed a slightly higher WCA after washing.
- The addition of C did not improve the washing durability of the hydrophobic effect.
- Overall, a lower concentration of MC (MC1) was sufficient to achieve satisfactory hydrophobicity of cotton and polyester fabrics.

Acknowledgements: This research was supported by Horizon Europe project **PROPLANET** (Grant agreement number 10109842) and Slovenian Research Agency (Research core funding No. P2-0152).

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