

Non-Biodegradable comercial materials



Paper-based alternatives

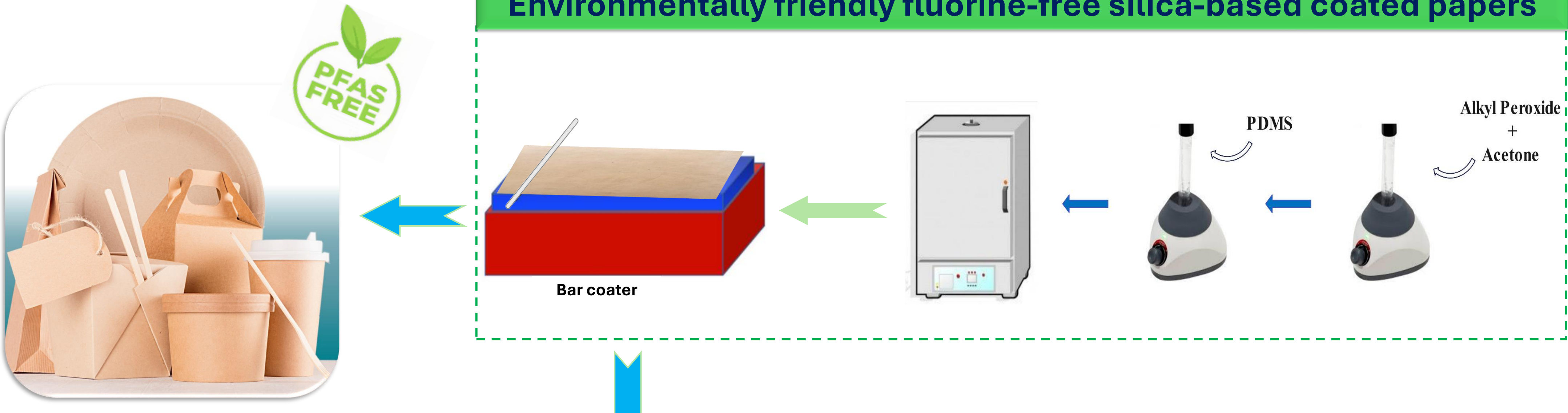
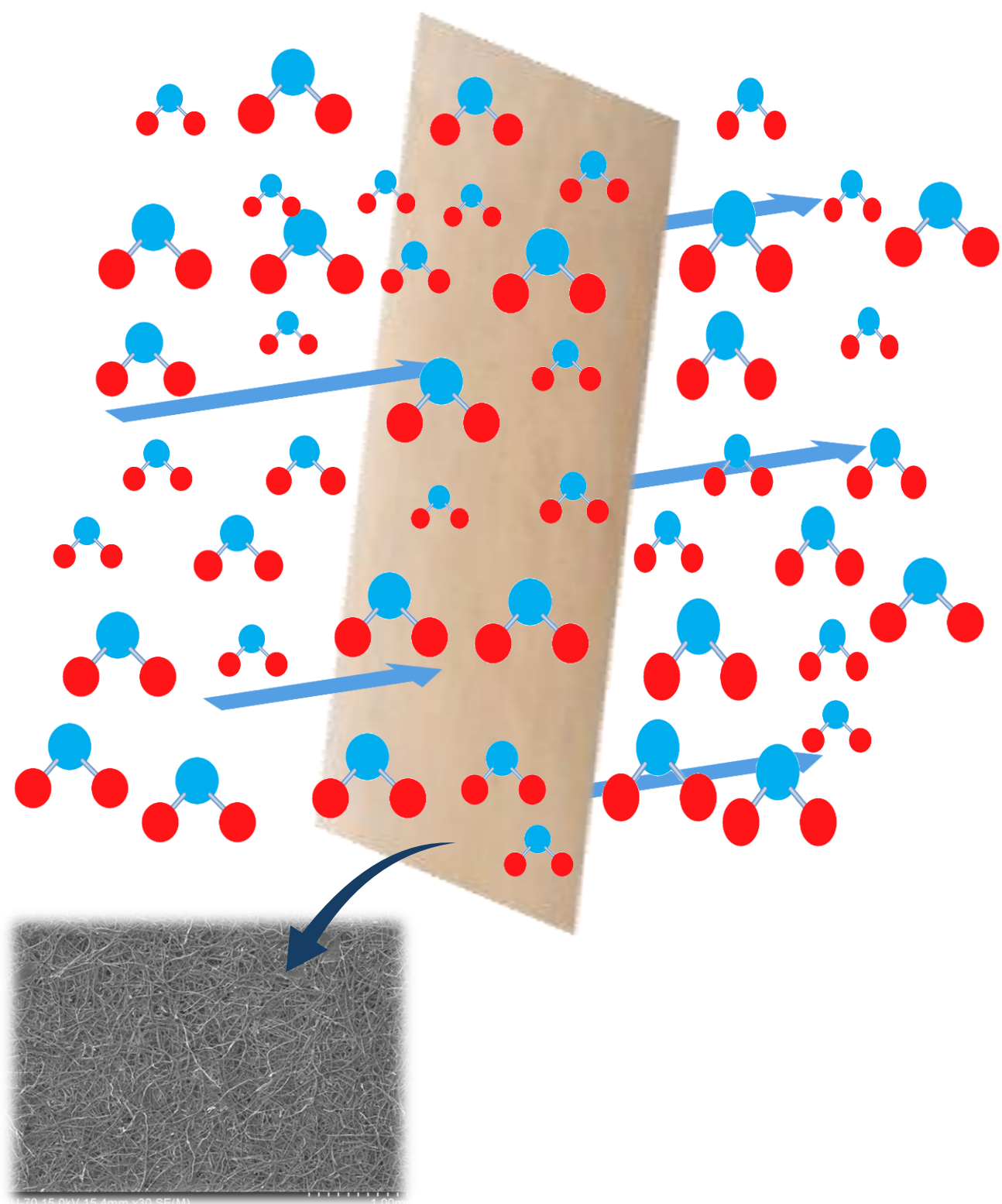


Table 1. Experimental data for all the formulations carried out in this study.

Formulations	PDMS ¹ (g)	Acetone (μL)	Alkyl Peroxide (AP) (wt/wt %)	Pick-up (g/m ²)
REF ¹	-	-	-	-
PDMS + AP_1.0%	1	200	1	23.8
PDMS + AP_1.5%	1	200	1.5	22.1
PDMS + AP_2.0%	1	200	2.0	19.6
PDMS + AP_2.5%	1	200	2.5	22.6
PDMS + AP_3.0%	1	200	3	16.8
PDMS + AP_3.5%	1	200	3.5	17.2
PDMS + AP_4.0%	1	200	4.0	20.0
PDMS + AP_4.5%	1	200	5.5	14.9
PDMS + AP_5.0%	1	200	5.5	14.9

¹Polydimethylsiloxane with viscosity of 500 cSt; ²Non-coated calendared kraft paper with grammage of 80 g/m².

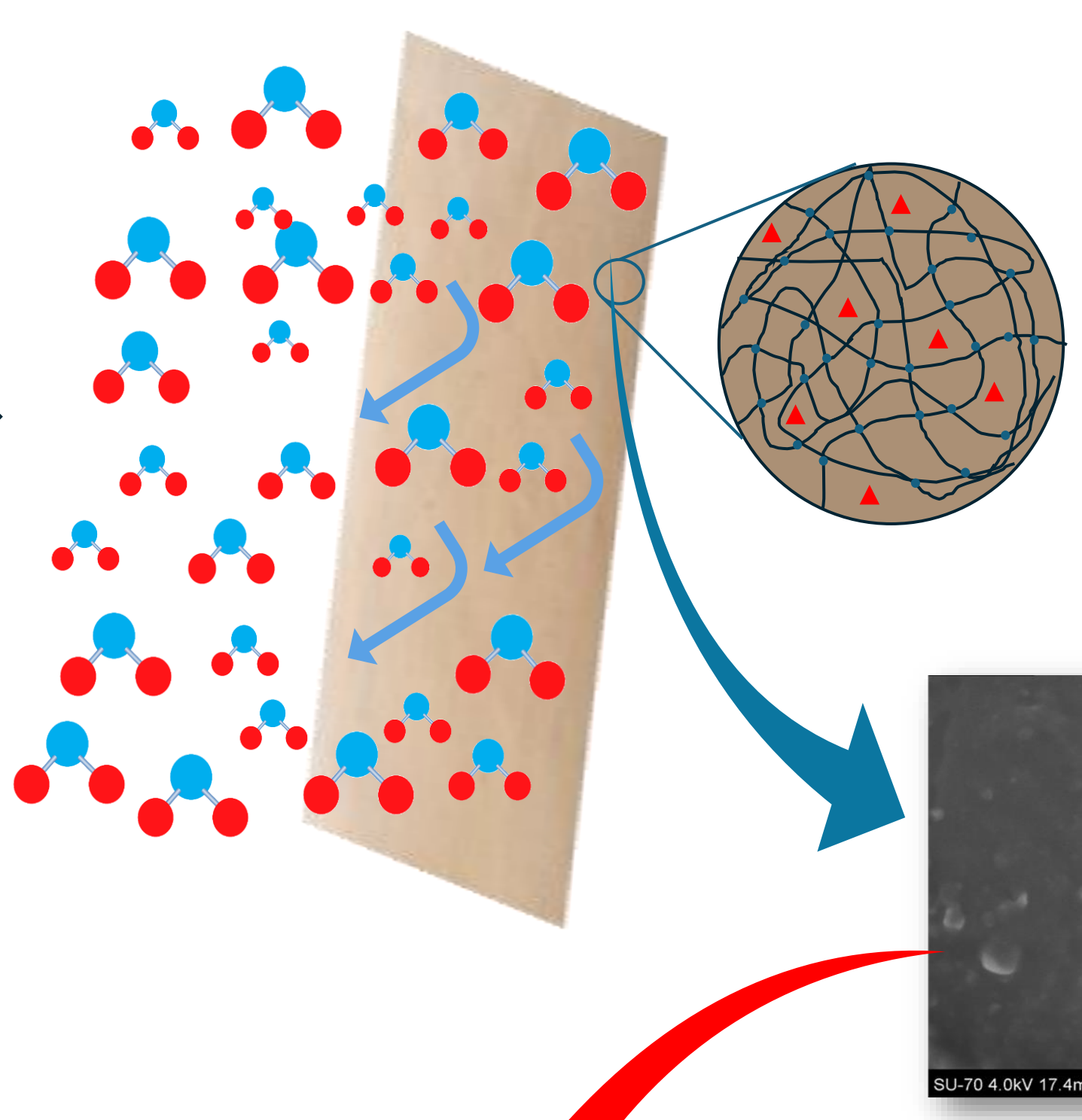
Uncoated Kraft paper



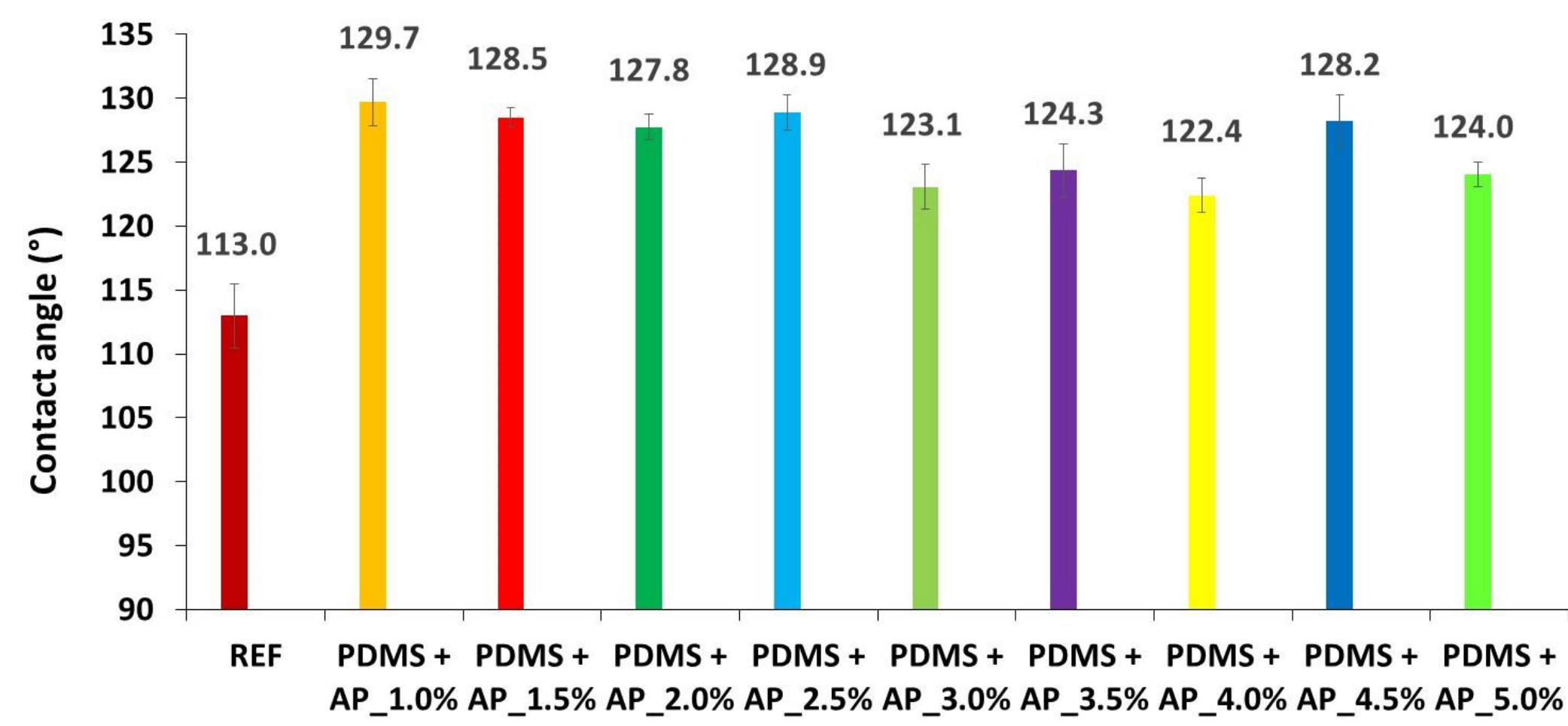
After coating

Reticulated PDMS based-coated Kraft paper

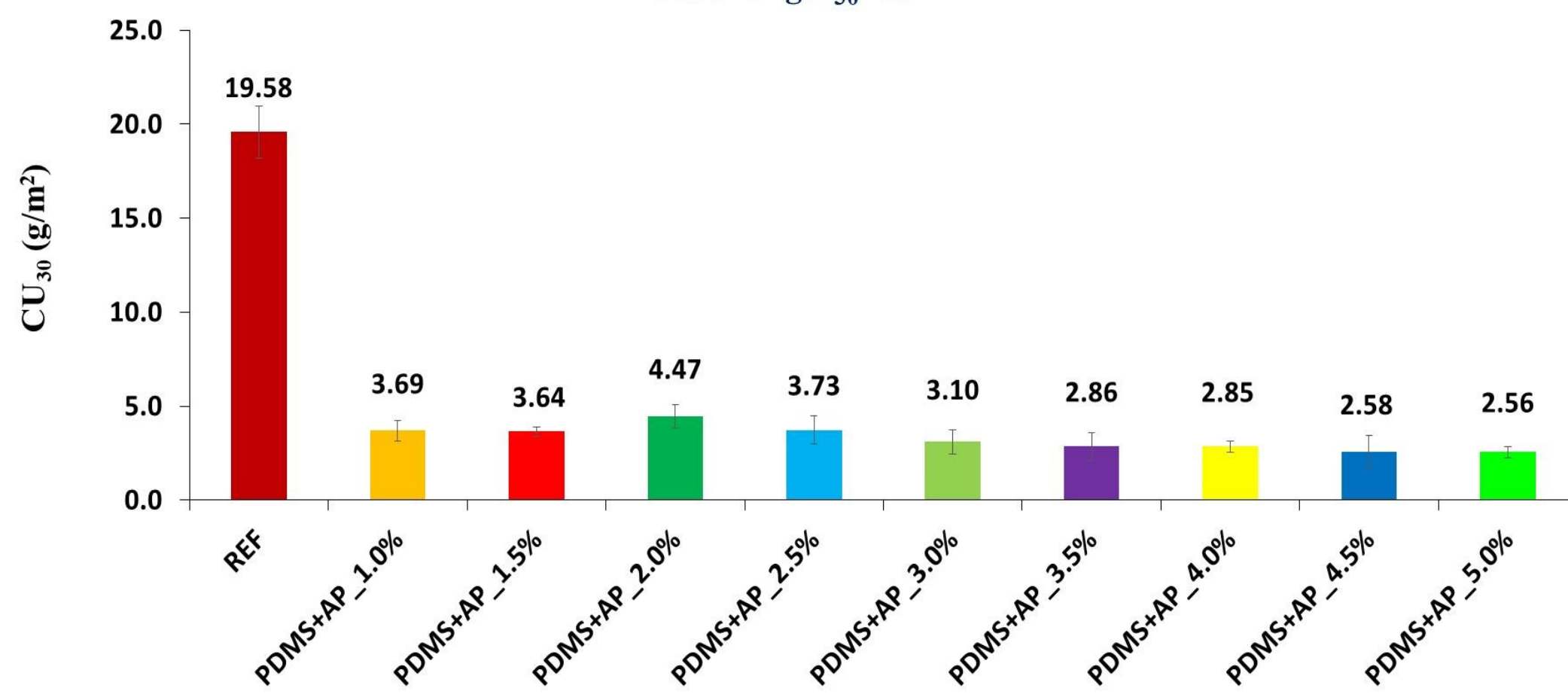
H₂O



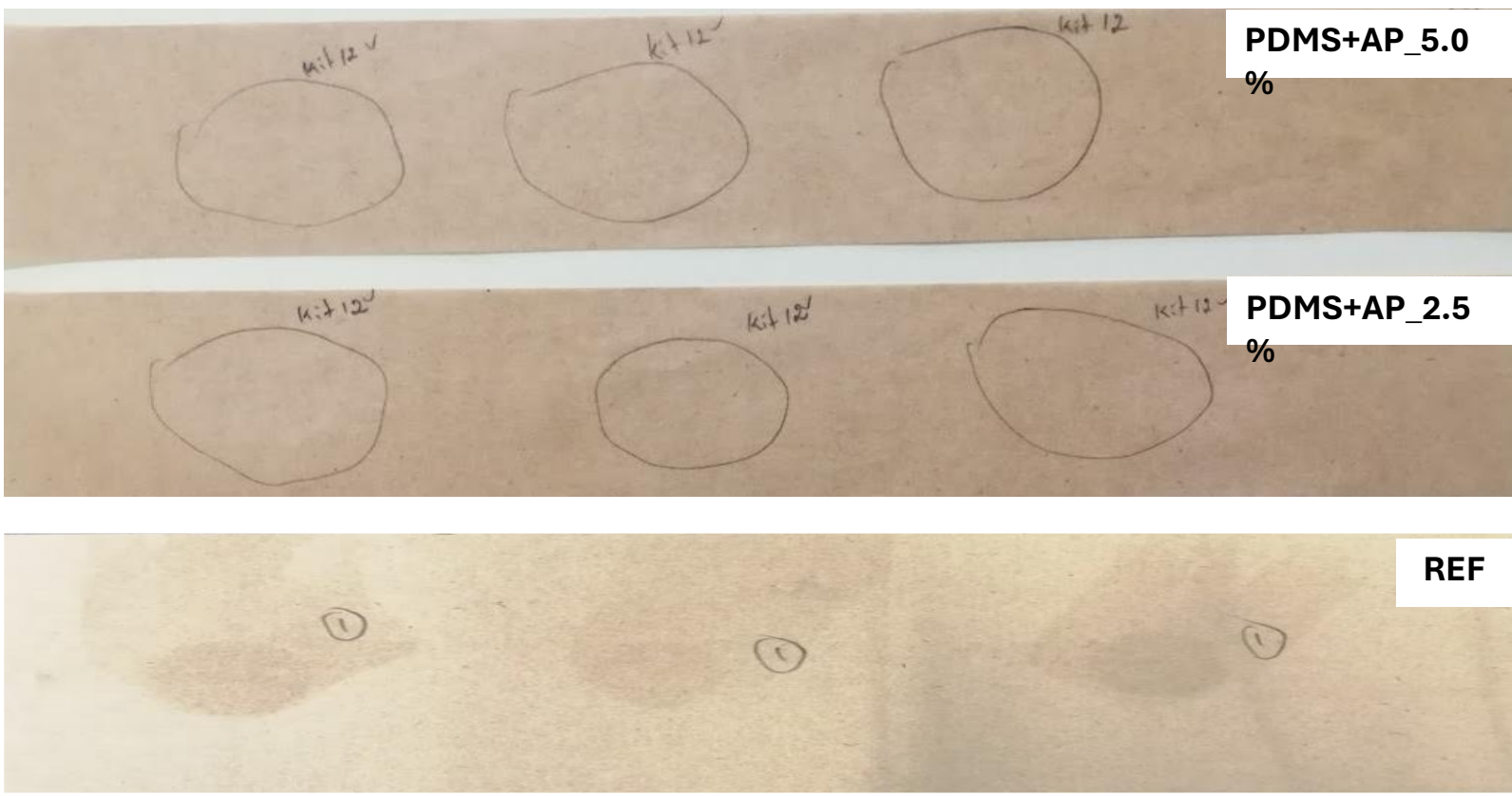
Improved water, oil and grease Resistance



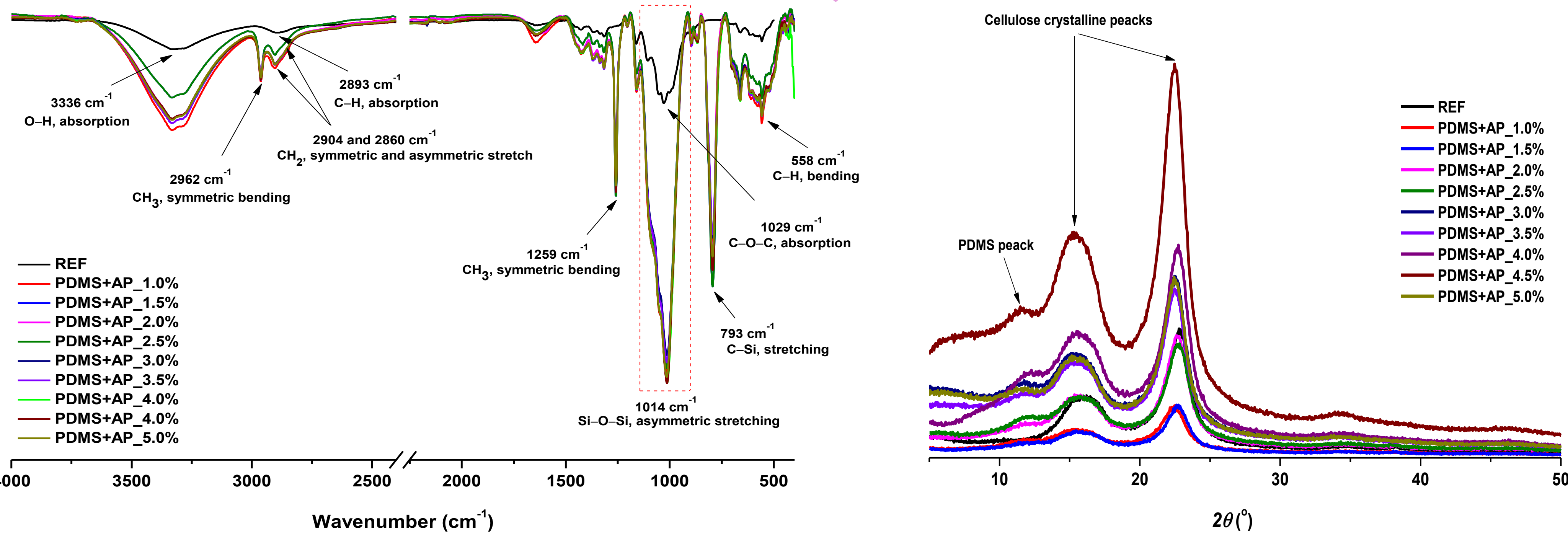
Cobb-Unger₃₀ test



KIT test



FTIR-ATR/XRD



Thermal and mechanical stability

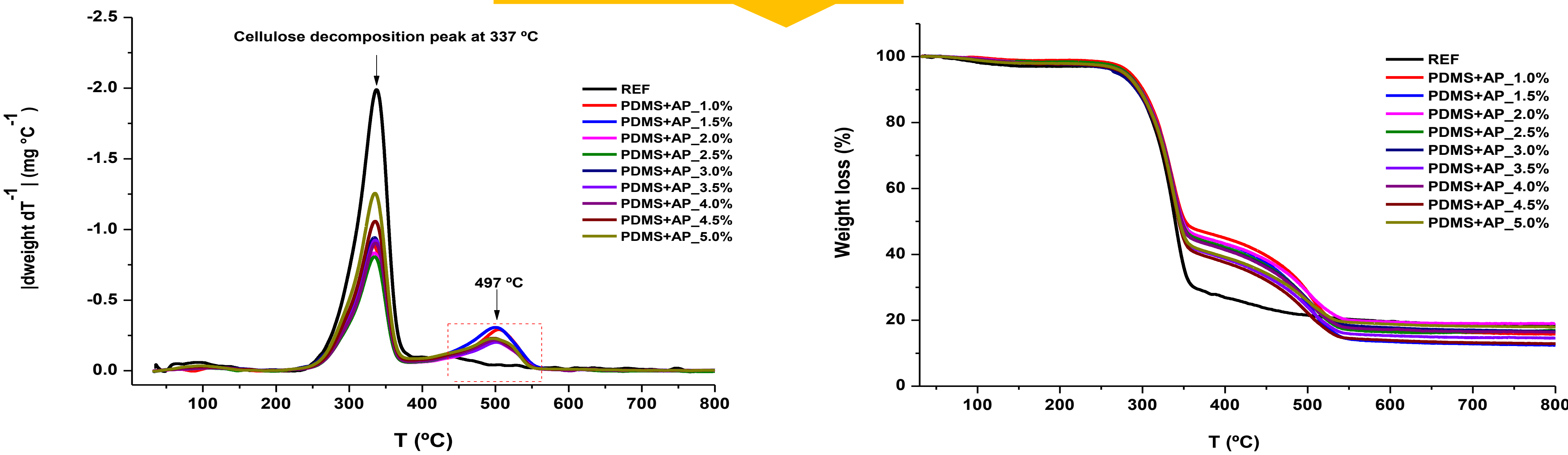


Table 2. Mechanical properties for all PDMS-based coated papers.

Formulations	REF	PDMS + AP_1.0%	PDMS + AP_1.5%	PDMS + AP_2.0%	PDMS + AP_2.5%	PDMS + AP_3.0%	PDMS + AP_3.5%	PDMS + AP_4.0%	PDMS + AP_4.5%	PDMS + AP_5.0%
E (Mpa)	1394 ± 35	1349 ± 36	1382 ± 37	1305 ± 39	1327 ± 52	1381 ± 22	1291 ± 53	1229 ± 32	676 ± 78	591 ± 64
Tensile Strenght (Mpa)	76.4 ± 3.2	73.0 ± 1.5	75.3 ± 2.8	75.8 ± 2.5	76.7 ± 3.2	73.7 ± 3.1	74.3 ± 4.4	76.8 ± 3.3	55.4 ± 0.4	53.1 ± 1.8
Elongation at break (%)	7.5 ± 0.5	7.8 ± 0.3	7.7 ± 0.6	7.2 ± 0.4	7.2 ± 0.4	6.8 ± 0.6	6.7 ± 0.6	6.6 ± 0.4	12.5 ± 0.8	12.2 ± 0.7

Conclusions

- ✓ PDMS-based coated papers demonstrated superior oil resistance: test kit rating 12/12 and Cobb-Unger values ranging from 2.56 to 4.47 g/m²;
- ✓ Enhanced water resistance was observed, with water contact angles values varying from 122 to 129°;
- ✓ The ensuing coated papers have shown enhanced thermal stability (T_{dmáx1}=337 °C; T_{dmáx2} 497 °C);
- ✓ Concerning their barrier properties, these materials could easily be applied in the field of paper-based food packaging.

Acknowledgements

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