

Development of Sustainable Superhydrophobic Leathers

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Introduction

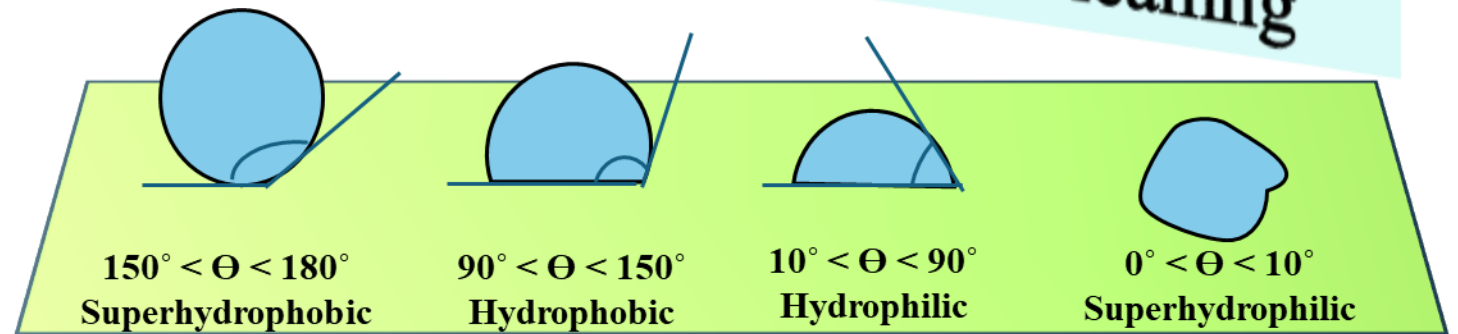


Why we need
Superhydrophobic
leather

Leather matters the
most



- Nature inspired
- Durable
- Self cleaning



Applications of Superhydrophobicity



Upholstery applications



Footwear



Fashion

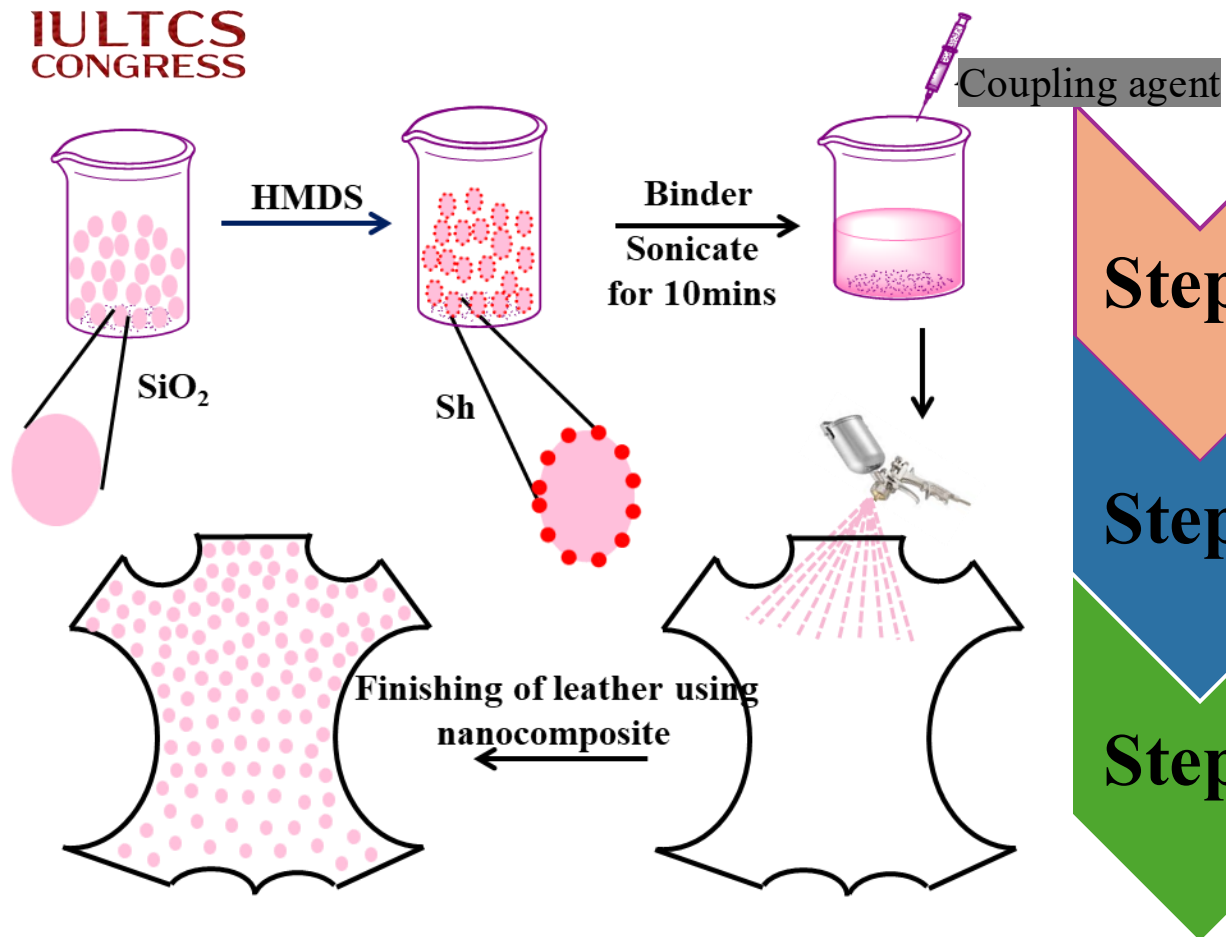


Protective clothing

Benefits of superhydrophobic leathers

- Water proof
- Stain resistant
- Easy-clean
- Long lasting

Methodology



Step 1

- Modification of SiO₂

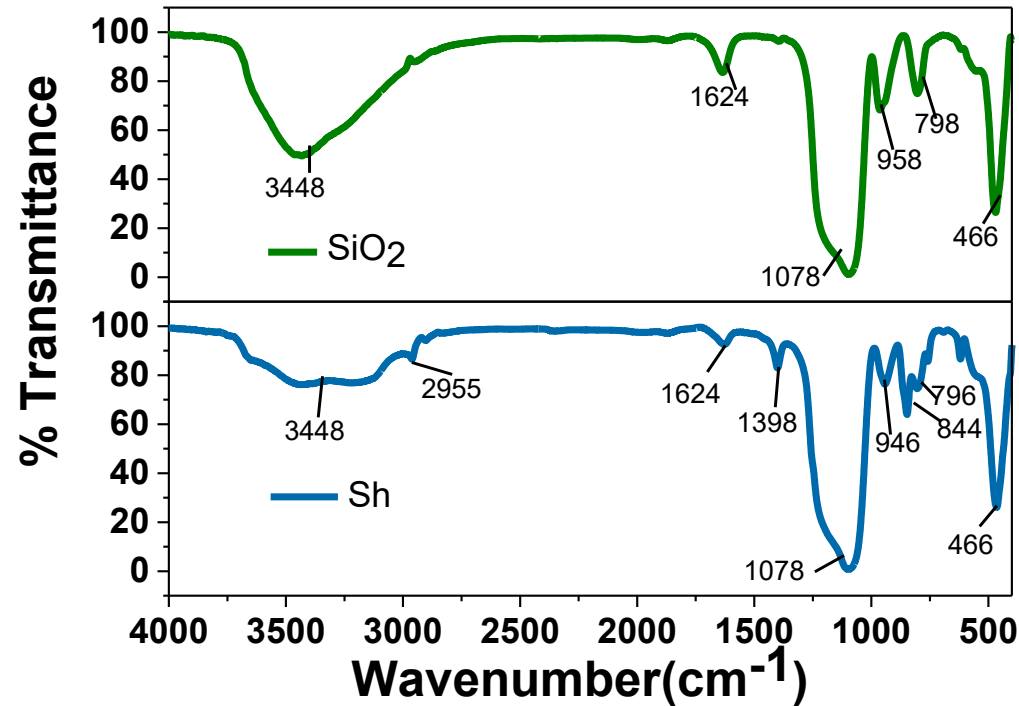
Step 2

- Preparation of acrylic resin

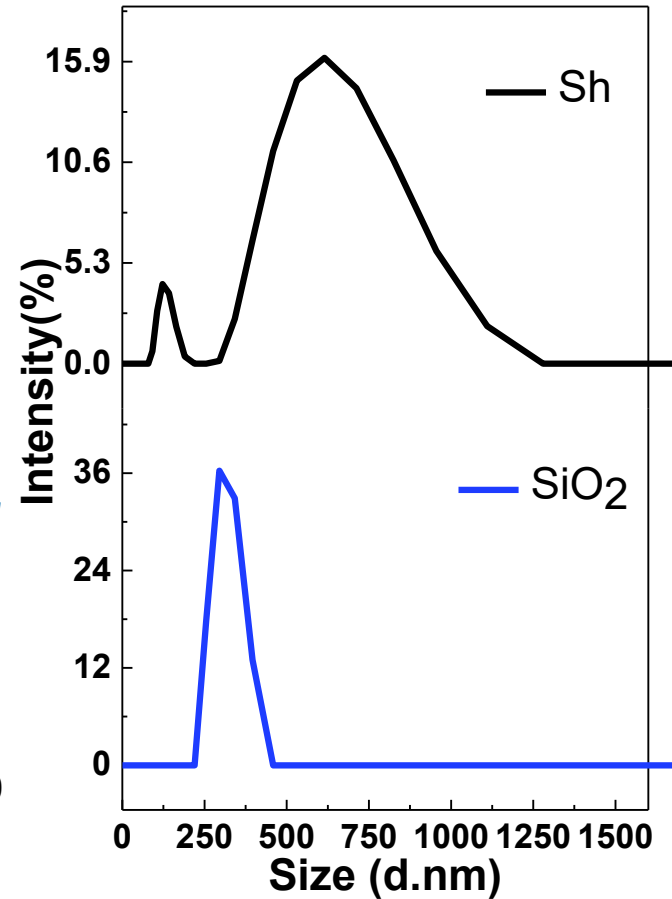
Step 3

- Preparation of coating formulation

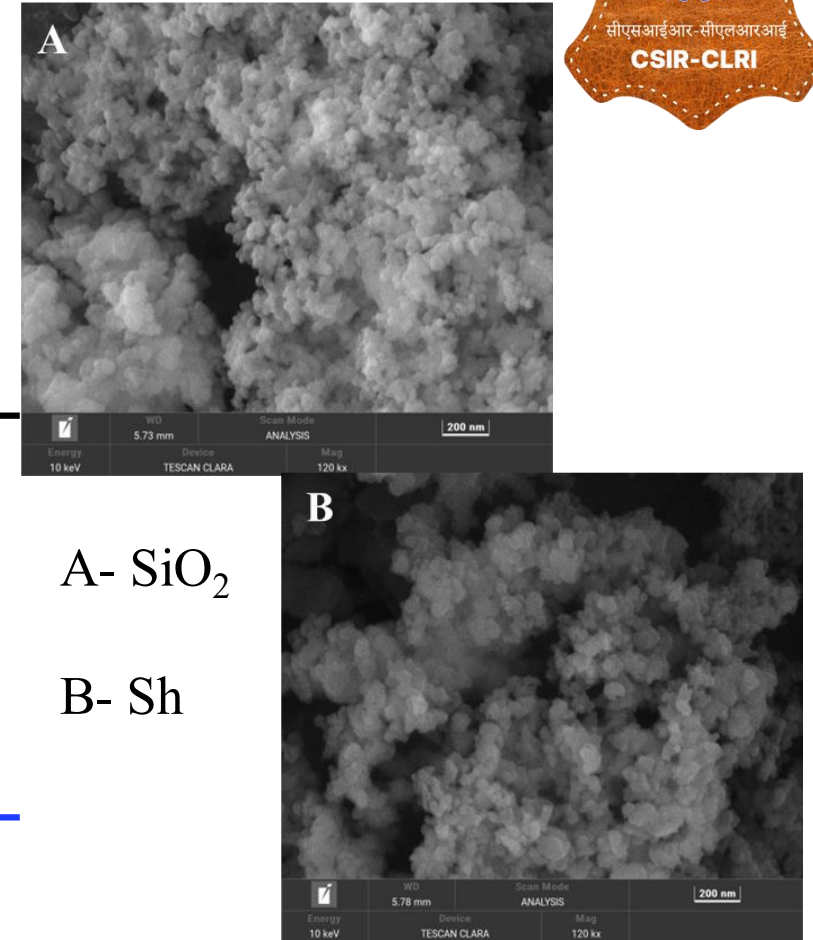
Characterisation of modified SiO_2



FT-IR spectra

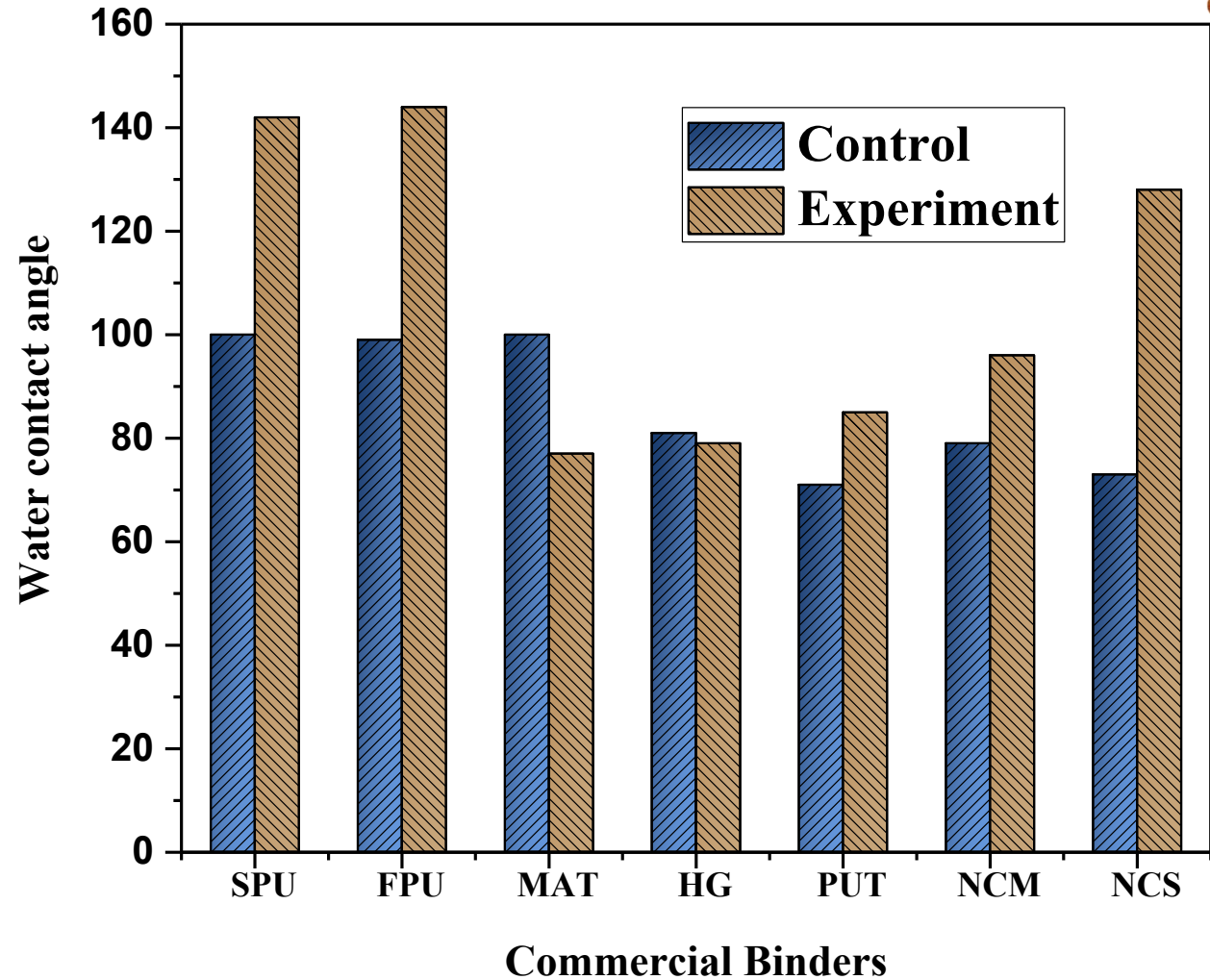
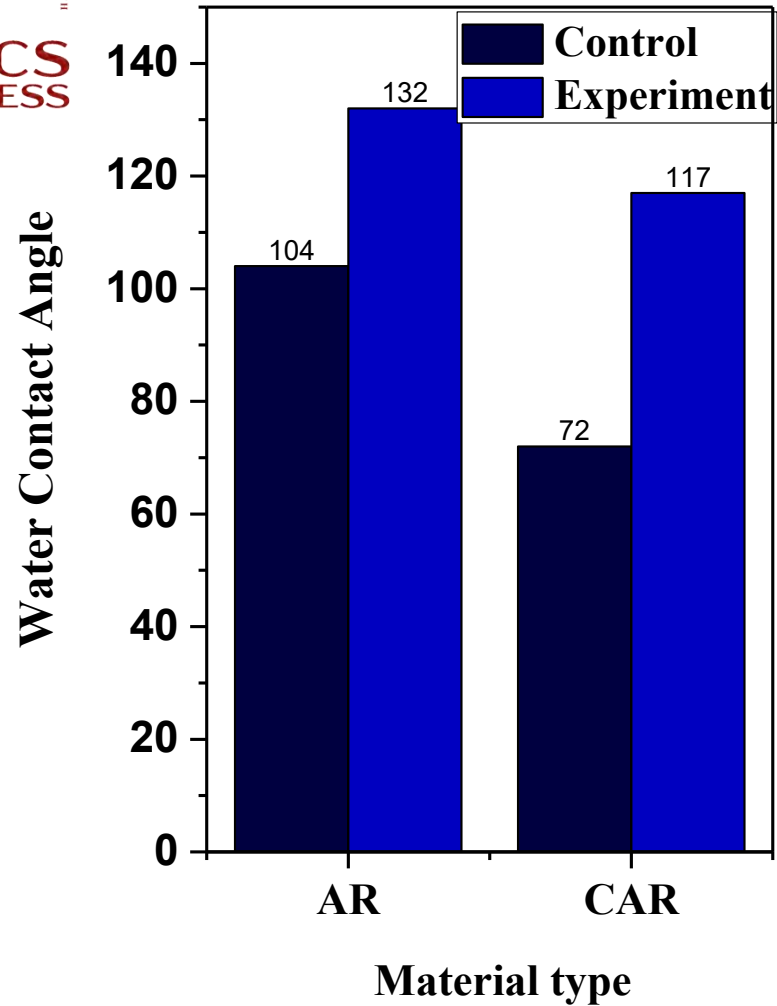


Particle size



FE-SEM micrographs

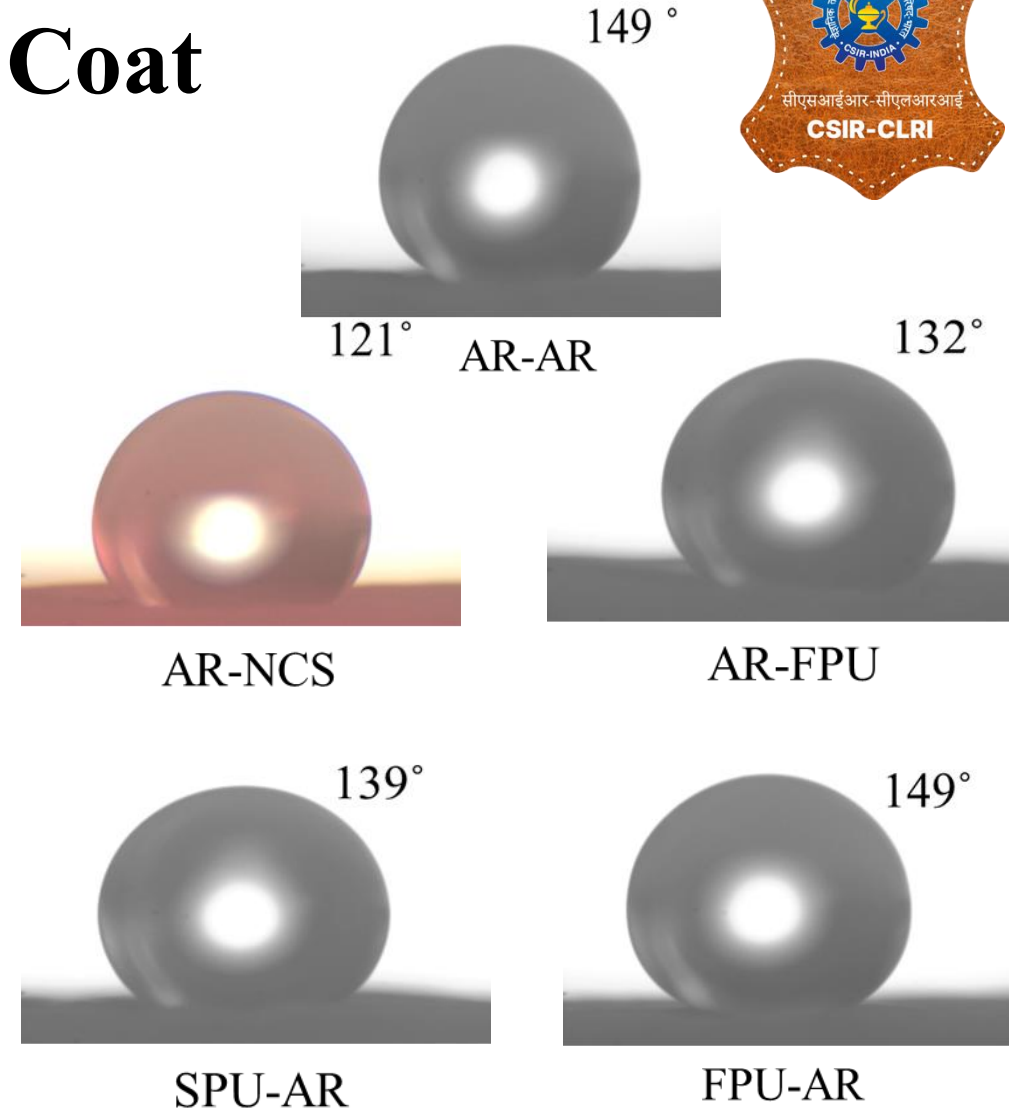
Contact Angle of Acrylic Resin, Commercial Acrylic Resin and Commercial Binders



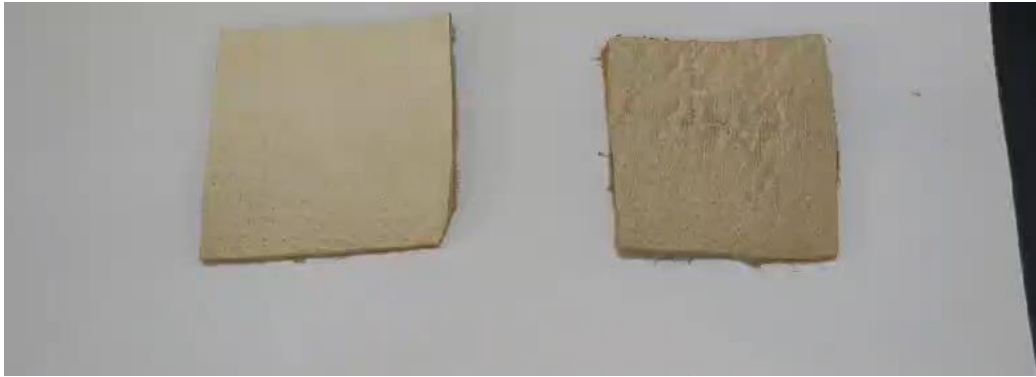
Finished Leather with Various Combination of Base and Top Coat



S:NO	Base coat (Binder+Sh)	Top coat (Binder+Sh+CA)	NAME
1	Acrylic Resin	Acrylic Resin	AR-AR
2	Acrylic Resin	NC Shine Lacquer	AR-NCS
3	Acrylic Resin	Filler PU	AR-FPU
4	Soft PU	Acrylic Resin	SPU-AR
5	Filler PU	Acrylic Resin	FPU-AR



Water Proofness of Coated Leather



AR-FPU (left) & FPU-AR (right)



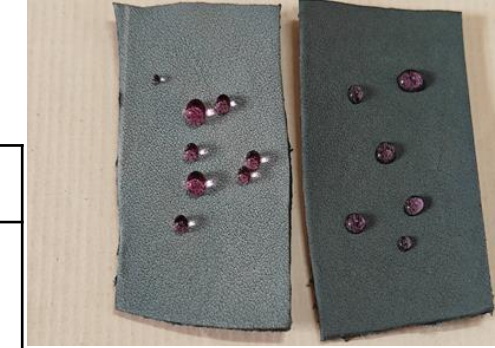
AR-FPU



FPU-AR

Further Developing AR and FPU

Sample Name	Base coat	Top coat(in IPA)	Type of coating	Contact angle	
				Without plating	With plating
AC	IPA	AR	Control	110°	105°
AE	Sh+IPA	Sh+ AR+ CA	Experiment	156°	143°
FC	IPA	FPU	Control	130°	122°
FE	Sh+IPA	Sh+ FPU+ CA	Experiment	154°	140°



AE

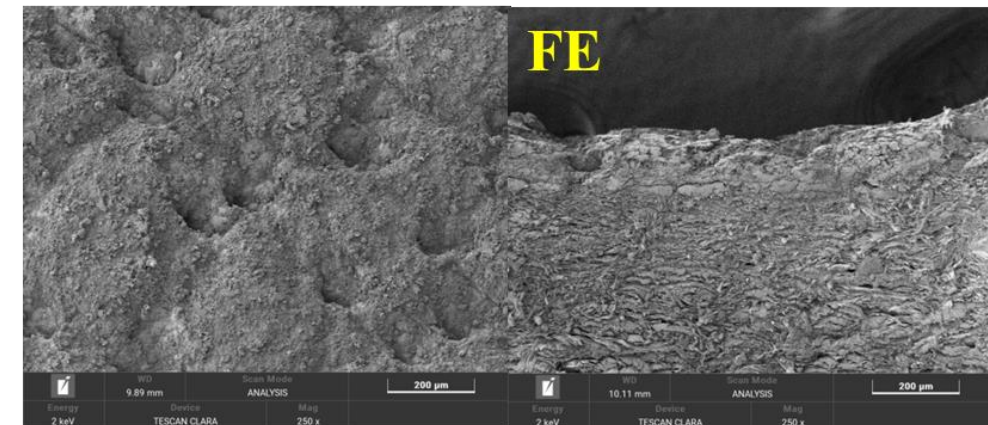
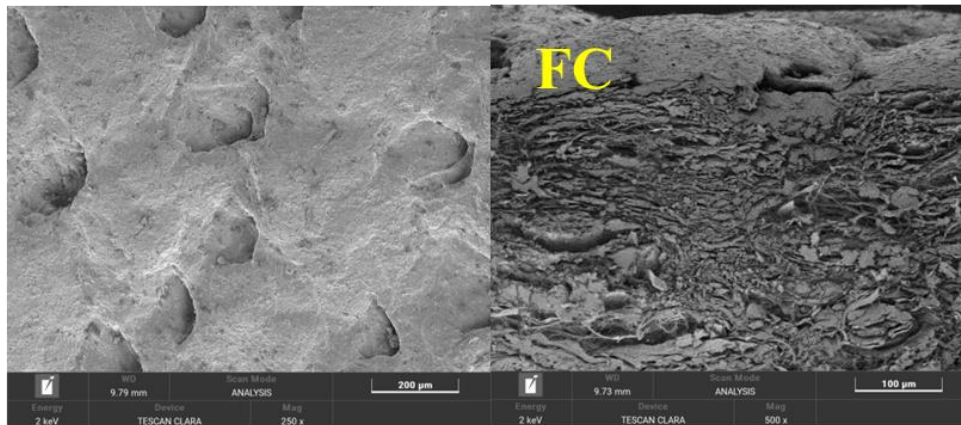
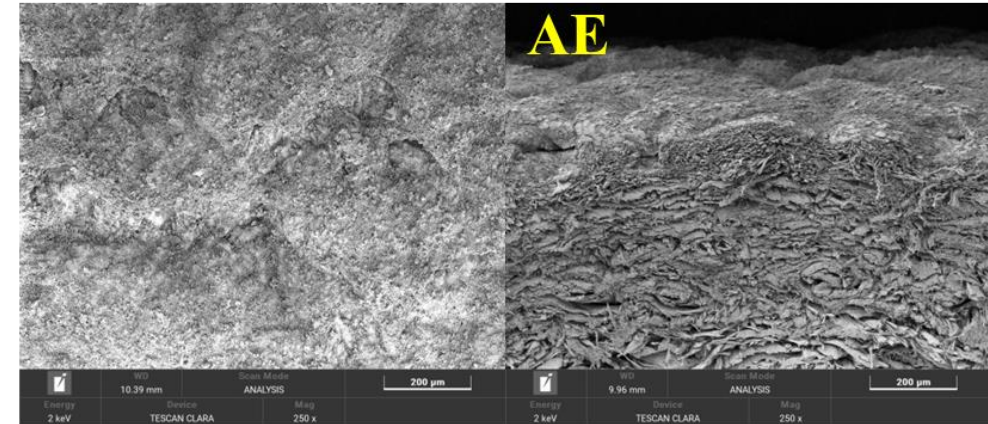
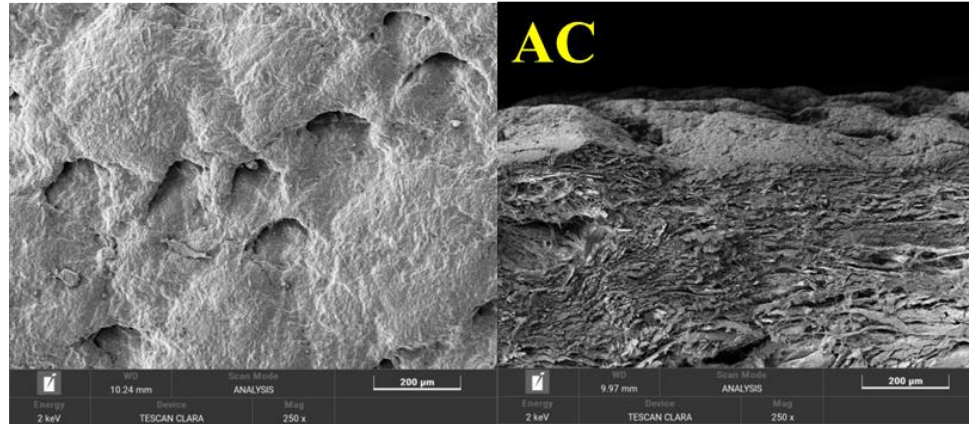
AC



FE

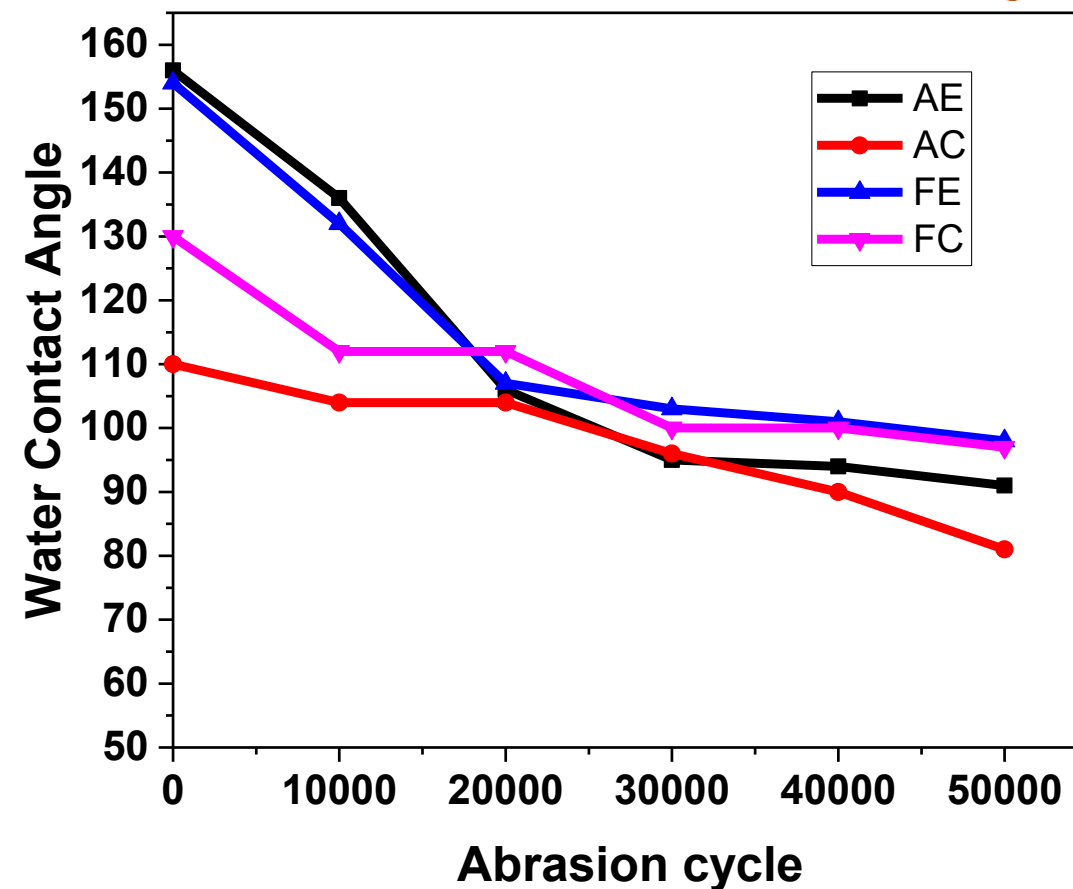
FC

FE-SEM Micrographs of Coated Leather



Rub-fastness and Abrasion of AC, AE, FC and FE

Sample Name	Dry 512 rubs		Wet 256 rubs	
	Material	Felt	Material	Felt
AC	4/5	4/5	4/5	4/5
AE	4/5	4/5	4/5	4/5
FC	4/5	4/5	4/5	4/5
FE	2	2/3	4/5	4/5



Conclusion

- Contact angle above 150° was achieved
- Rub fastness report of leather show the material has good adhesion onto the leather surface
- Further development for commercial level upscaling is in progress

Acknowledgement



ILTA



Thank you