



High Performance Bio-based Functional Coatings for Wood and Decorative Applications



Results on end-use applications

Webinar 5

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Bio-based Industries
Consortium



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Content



Test results in UV curable wood coatings

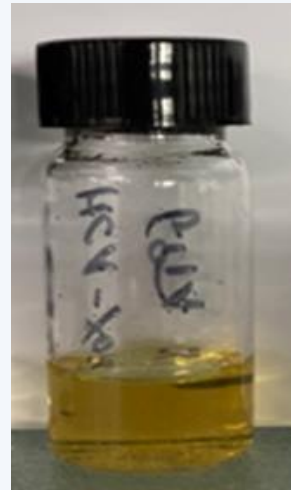
Testing of basic properties in UV-coatings

Test results of two promising biobased binder candidates

based on different carbohydrate molecules
chemically modified and functionalized

BBB-UV 1

- yellowish colored, water-like liquid



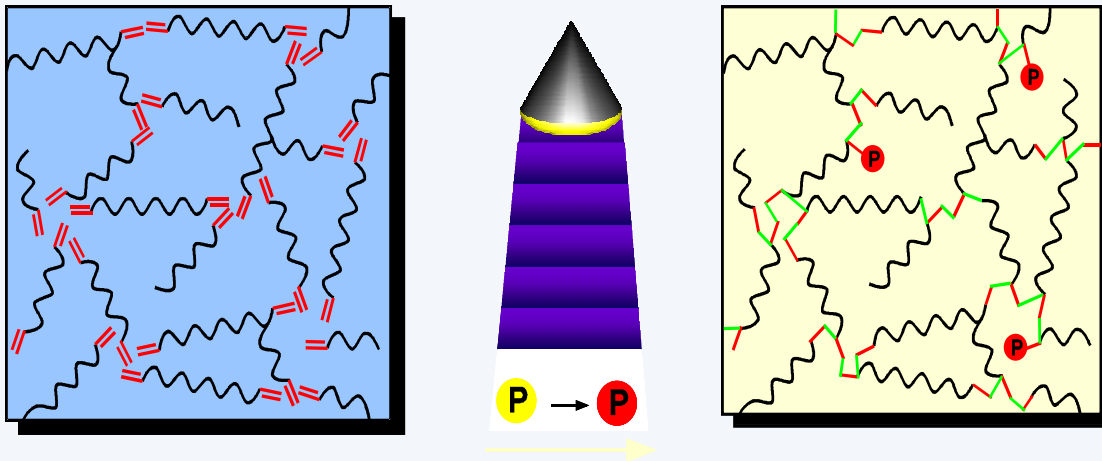
BBB-UV 2

- clear, gel-like, viscous liquid



Testing of basic properties in UV-coatings

1st focus : UV-crosslinking



Test of curing performance:

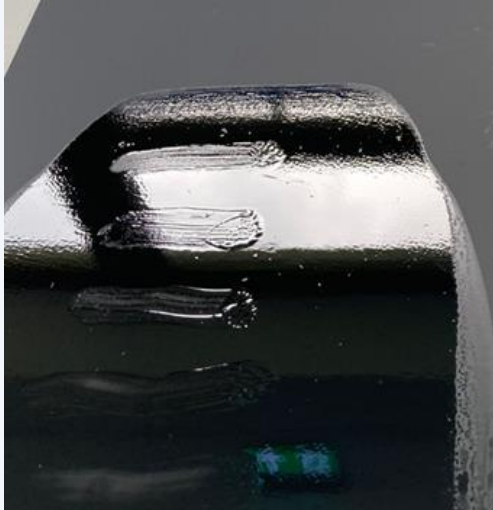
- 120 W/cm Hg-lamp
- Line speed 20 m/min
- UV-parameters 100mJ/cm² / 400mW/cm²
- Number of necessary passes for curing

Testing of basic properties in UV-coatings

pure biobased binders

BBB-UV 1:

- wet film after 5 passes
- no polymerisation



BBB-UV 2:

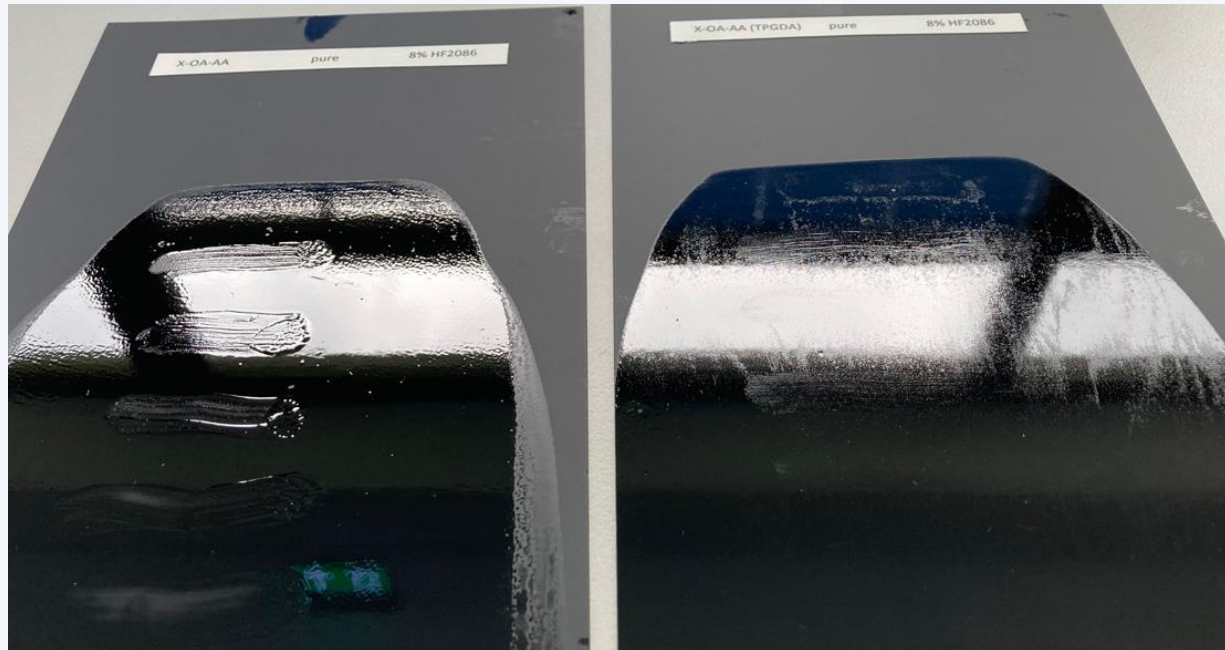
- deep curing after 1 pass
- sticky, adhesive like surface after 5 passes



Testing of basic properties in UV-coatings

biobased binders + UV monomer

BBB-UV 1 + 50% TPGDA (Tripropylenglycol-diacrylate)



Testing of basic properties in UV-coatings

biobased binders + UV monomers

sample	co-monomer	ratio	initiator	reactivity	cured film	reactivity	comment
BBB-UV 1	TPGDA	90 / 10	10%	>5	not o.k.	>5	poor surface curing
		80 / 20		>5	not o.k.	>5	poor surface curing
		70 / 30		>5	not o.k.	>5	poor surface curing
		60 / 40		>5	not o.k.	>5	poor surface curing
BBB-UV 1	GPTA	90 / 10	10%	>5	not o.k.	>5	poor surface curing
		80 / 20		>5	not o.k.	>5	poor surface curing
		70 / 30		3	o.k.	3	
		60 / 40		3	o.k.	3	
BBB-UV 1	DPHA	90 / 10	10%	5	not o.k.	5	poor surface curing
		80 / 20		3	o.k. ?	3	incompatibility ?
		70 / 30		3	o.k. ?	3	incompatibility ?
		60 / 40		3	not o.k.	3	incompatibility

Tripropylenglycol-diacrylate – f=2

Glycerol-(propoxylated)-triacrylate – f=3

Di-Pentaerythrol-hexaacrylate – f=6

Testing of basic properties in UV-coatings

biobased binders + UV monomers

sample	co-monomer	ratio	initiator	reactivity	cured film	reactivity	comment
BBB-UV 2	GPTA	90 / 10	10%	>5	not o.k.	>5	poor surface curing
		80 / 20		>5	not o.k.	>5	poor surface curing
		70 / 30		3	o.k.	3	
		60 / 40		3	o.k.	3	
BBB-UV 2	DPHA	90 / 10	10%	5	not o.k.	5	poor surface curing
		80 / 20		3	o.k.	3	
		70 / 30		3	good	1	
		60 / 40		3	good	1	

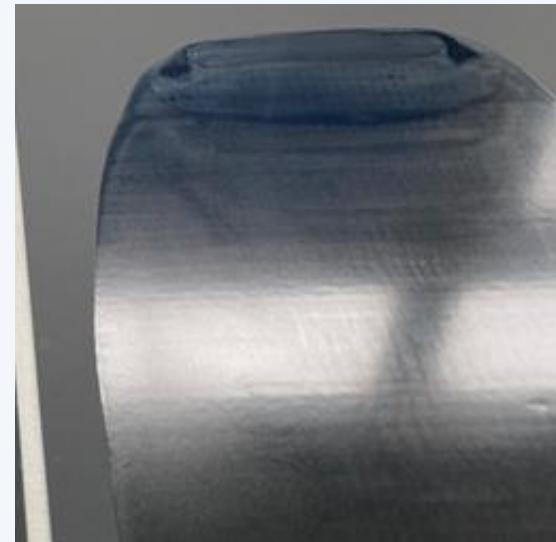
Most promising combinations:

- **BBB-UV 1 / GPTA 70/30**
- **BBB-UV 2 / DPHA 70/30**

Testing of basic properties in UV-coatings

biobased binders + UV monomers + fossile binder

formulation		cured film	reactivity
BBB-UV 1	42	good	2
GPTA	18		
Epoxyacrylate-oligomer	40		
photoinitiator	5		
	105		



Testing of basic properties in UV-coatings

Test formulations: UV-filler

BBB-UV 1	28
GPTA	12
Epoxyacrylate-oligomer f=2	22
TEGO Dispers 689	0,3
TEGO Airex 990	0,1
Jetfine 2	33
Irgacure 184	4
	99,4

BBB-UV 2	44
DPHA	18
TEGO Dispers 689	0,3
TEGO Airex 990	0,1
Jetfine 2	33
Irgacure 184	4
	99,4

Testing of basic properties in UV-coatings

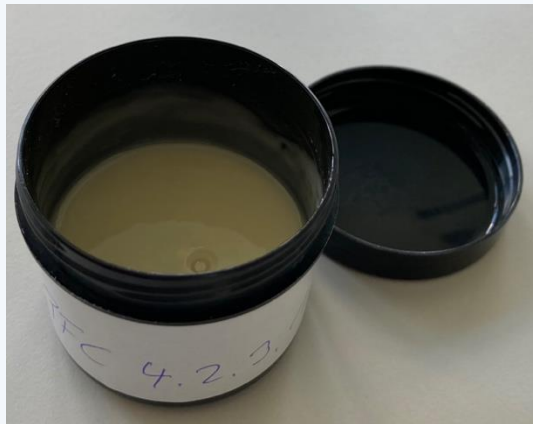
Test formulations: UV-topcoat

BBB-UV 1	33
GPTA	11
Urethaneacrylate f=6	25
Polyetheracrylate, aminemodified f=3	6
TEGO Airex 990	0,2
Jetfine 2	12
Acematt OK412	6
Irgacure 184	5
TEGO Rad 2500	0,2
	98,4

BBB-UV 2	45
DPHA	20
Polyetheracrylate, aminemodified f=3	10
TEGO Airex 990	0,2
Jetfine 2	12
Acematt OK412	6
Irgacure 184	5
TEGO Rad 2500	0,2
	98,4

Testing of basic properties in UV-coatings

Full wood coating setup:



- sanding
- UV-filler 25 g/m²
- Curing
- UV-filler 15 g/m²
- Curing
- Sanding
- UV-topcoat 5 g/m²
- Curing
- UV-topcoat 5 g/m²
- Curing

Thank you for your attention !