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NOVEL BIOBASED MATERIALS TO IMPROVE CIRCULARITY

Biobased & Bisphenol-free epoxy resin design for 3R CAN material system

Circular Bio-based Europe Joint Undertaking

Bio-based Industries Consortium

Co-funded by the European Union

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The problem that solves

Current industrial resins are bisphenol-A based and petro-based (or biobased at very low %, 28%) and as standard thermosets they are no recyclable

Unique properties and innovation

- 83 % biobased & bisphenol-free epoxy formulations
- When combined with reversible hardener : reshapability has been proven



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Remise en forme GEN 2.0



Initial part

Cutting



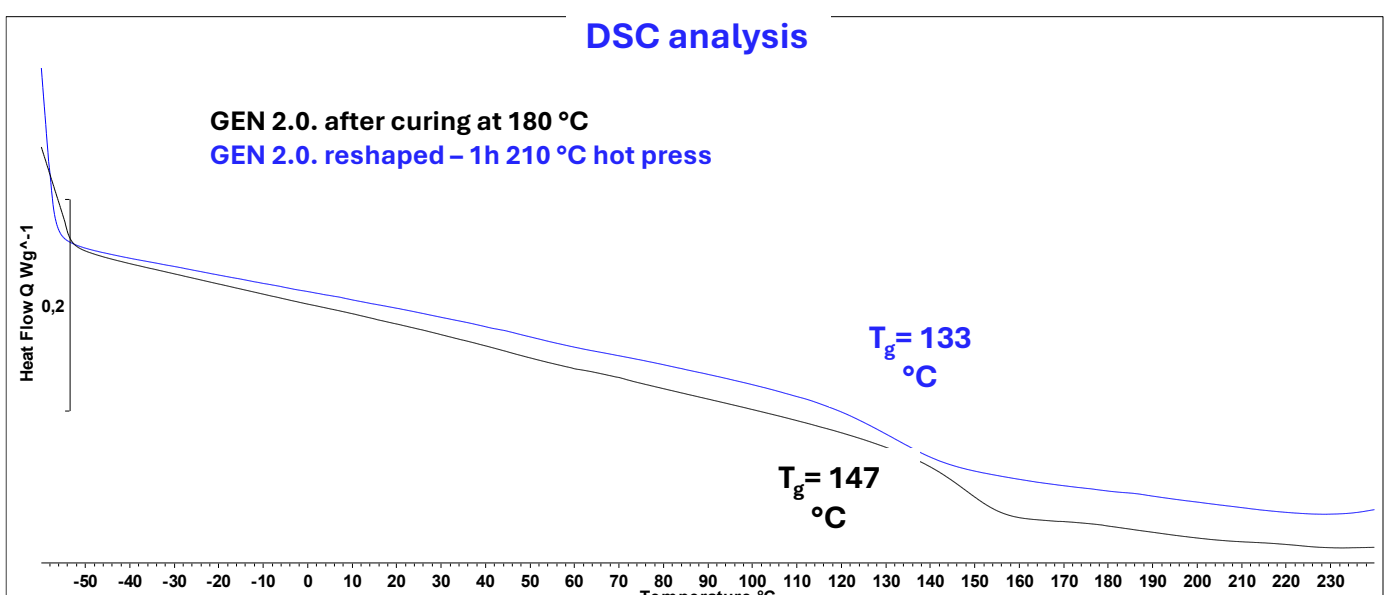
Small fragments

Hot Press
1h 210 °C



New material

DSC analysis



✗ Too far from specification or poor

↻ Not optimum / Can be improved

✓ Fit specification or optimum

		Features		Manufacturing	Processability & materials					Reversible properties
Entry	Name	BBC (%)	Bisphenol-free	Scalability	Viscosity	Impregnation	Tack	T_g	Perf meca	
1	Ref.	0	NO	--	✓	✓	✓	✓	Ref.	NO
2	GEN 1.0-A	✓	Yes	✗	✓	✓	nd	✓	nd	✓
3	GEN 1.0-B	✓	Yes	✓	✓	✓	✓	✓	nd	✓
4	GEN 1.0-C	✓	Yes	✓	✓	✓	↻	✓	✗	✓
5	GEN 1.1-A	✓	Yes	✓	✓	✓	✗	✓	✗	✓
6	GEN 1.2 – C1	✓	Yes	✓	✓	✓	✓	✓	✓	✓
7	GEN 1.2 – C2	✓	Yes	✓	✓	✓	✓	✓	↻	✓
8	GEN 1.2 – C2	✓	Yes	✓	✓	✓	✓	✓	↻	✓
9	GEN 2.0-A2	✓	DGEBA/BP A-free	↻	✓	✓	✗	✓	✗	✓ ⊕
10	GEN 2.0-A1	✓	DGEBA/BP A-free	↻	✓	✓	✗	✓	↻	✓ ⊕

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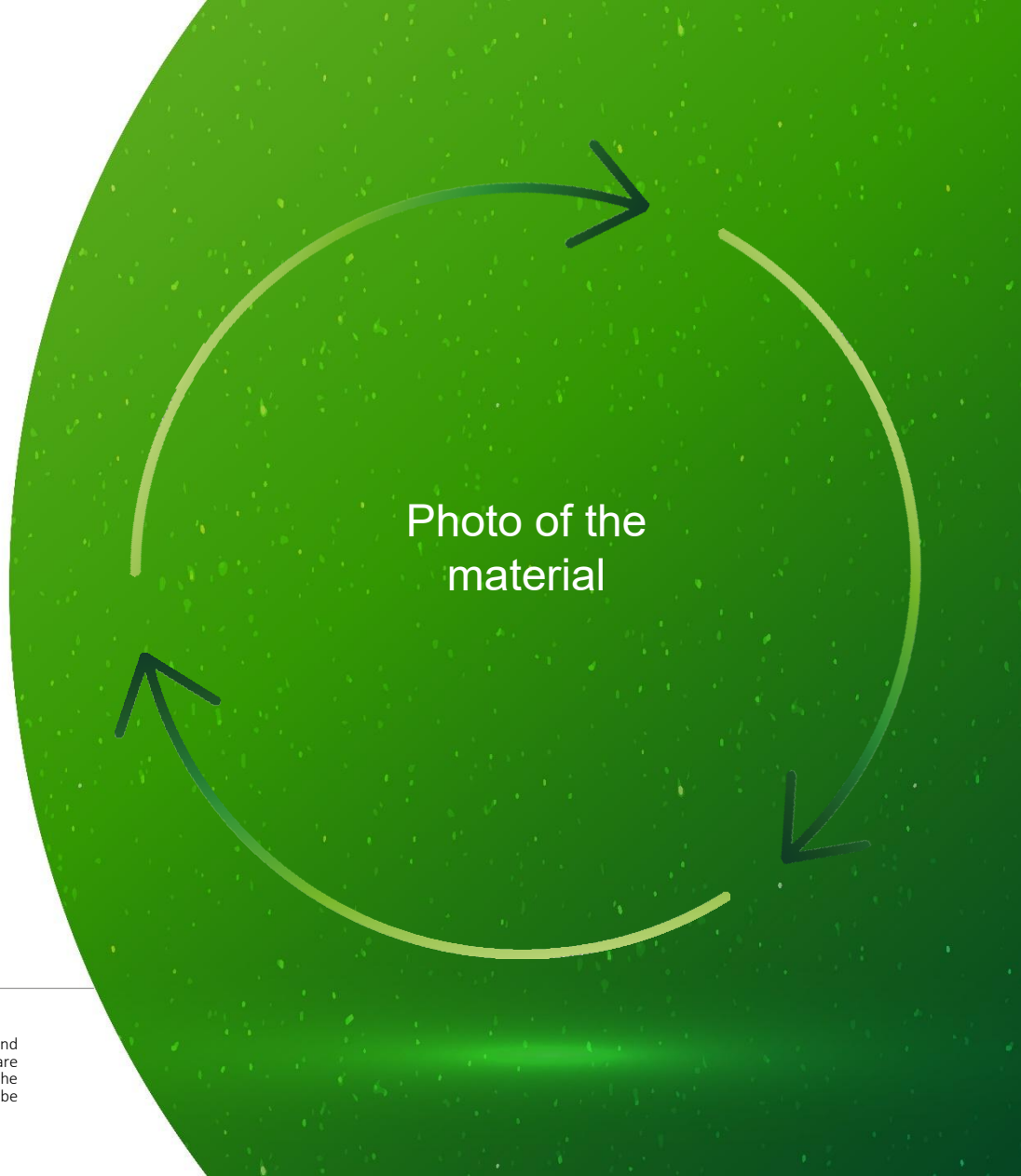
Main benefits

- Bisphenol-free with the Highest biobased % reached on the market (BBC = 83 %)
- The GEN 1 (improved with some additives) showed better performances than the reference taken for the project (commercial ARALDITE epoxy resin and 4-AFD as reversible hardener)



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Unique selling points

- Highest biobased carbon content on the market 83 %
- Epoxy formulation totally bisphenol-free
- Vitrimer technology

Potential applications, industries

- Dry filament winding
- All process that require this viscosities with average to high Tg > 150 °C



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