

LIGNICOAT

Sustainable coatings based on lignin resins and bio-additives with improved fire, corrosion and biological resistance

“Biobased Polymers in Europe: What’s New?”

Dr. Michele Ponzelli – LIGNICOAT Comm. & Diss. Manager



The coating industry challenge



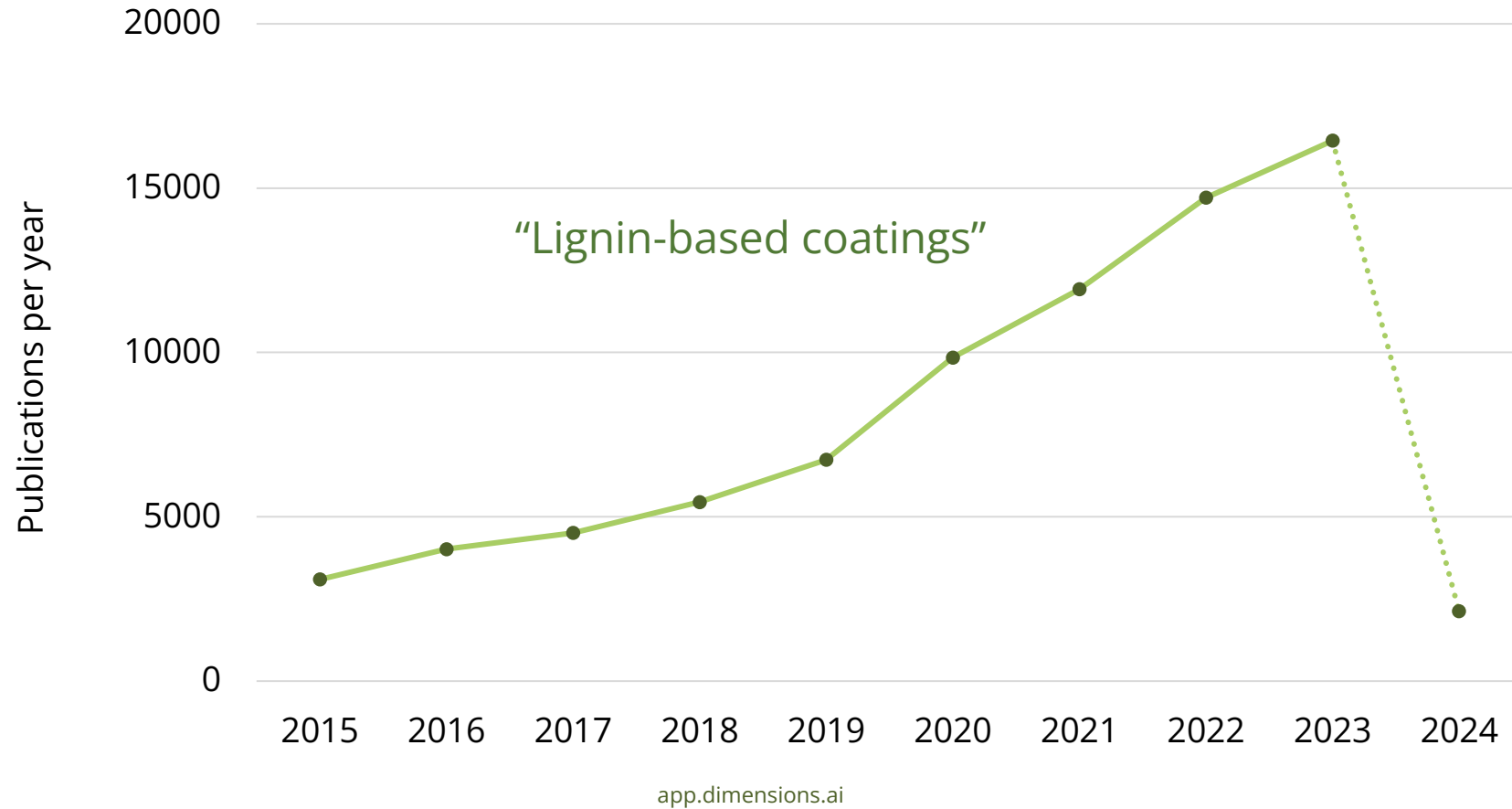
The environmental impact of fossil-based coatings and volatile organic compounds (VOCs) emissions has raised concerns, and regulations were implemented to diminish their use in coatings.



Why lignin

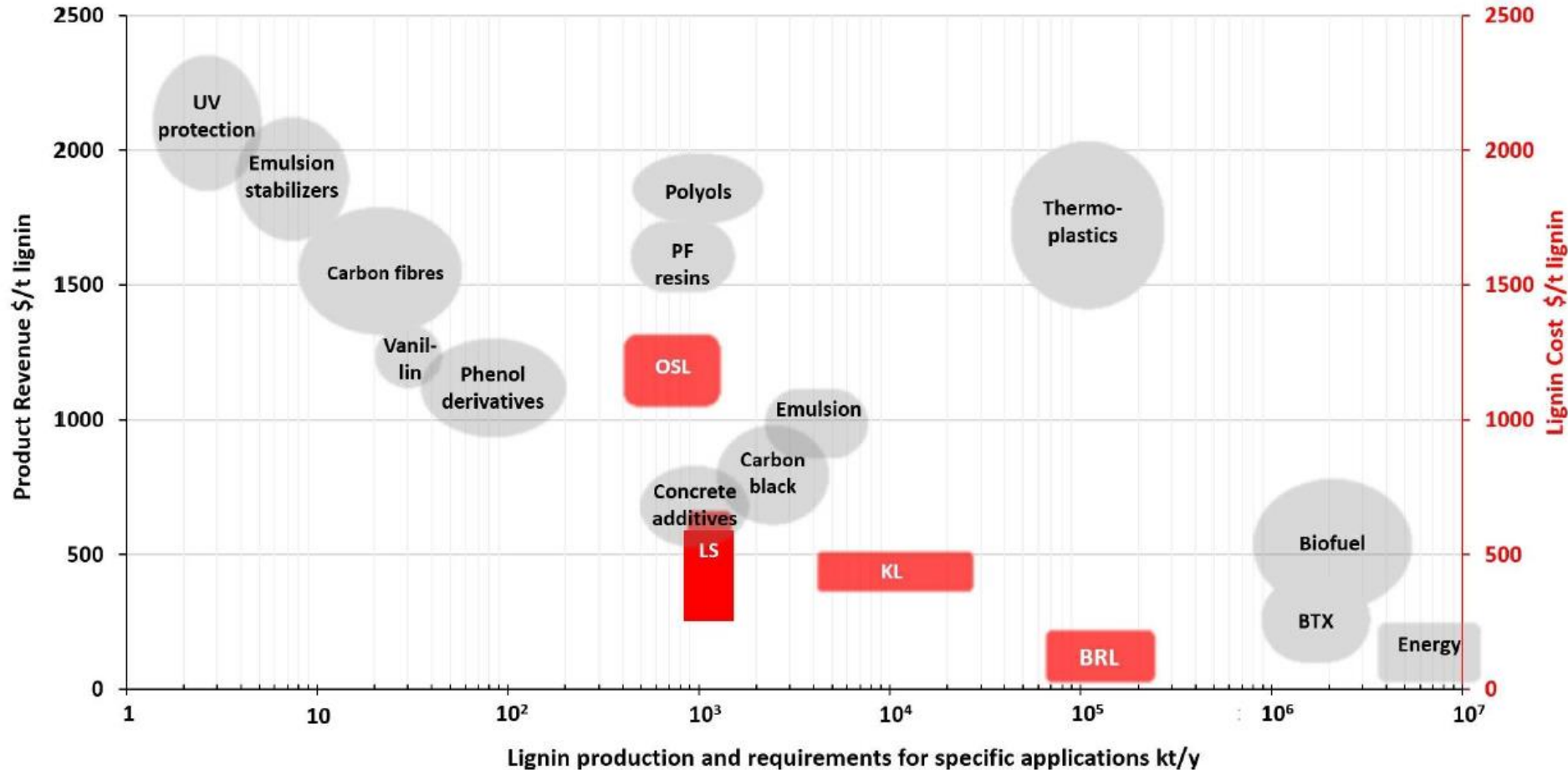


Lignin is one of the most abundant organic polymers on Earth



This project has received funding from the Bio-based Industries Joint Undertaking (JU) under the European Union's Horizon 2020 research and innovation programme under grant agreement No 101023342. The JU receives support from the European Union's Horizon 2020 research and innovation programme and the Bio-based Industries Consortium.

Lignin market and applications



PF – Phenol-formaldehyde
 OSL – Organosolv lignin
 LS – Lignosulfonates
 KL – Kraft lignin
 BRL – Biorefinery lignin

Balakshin et al., ChemSusChem 2021, doi.org/10.1002/cssc.202002553

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Lignin biomass as feedstock



LIGNICOAT aims to demonstrate the technical and economic feasibility of the use of lignin as raw material to produce 3 bio-resins for wood, metal, furniture, automotive, flooring, machinery and paints industry.



LIGNICOAT's sustainable solution



LIGNICOAT's solutions involve the use of lignin.

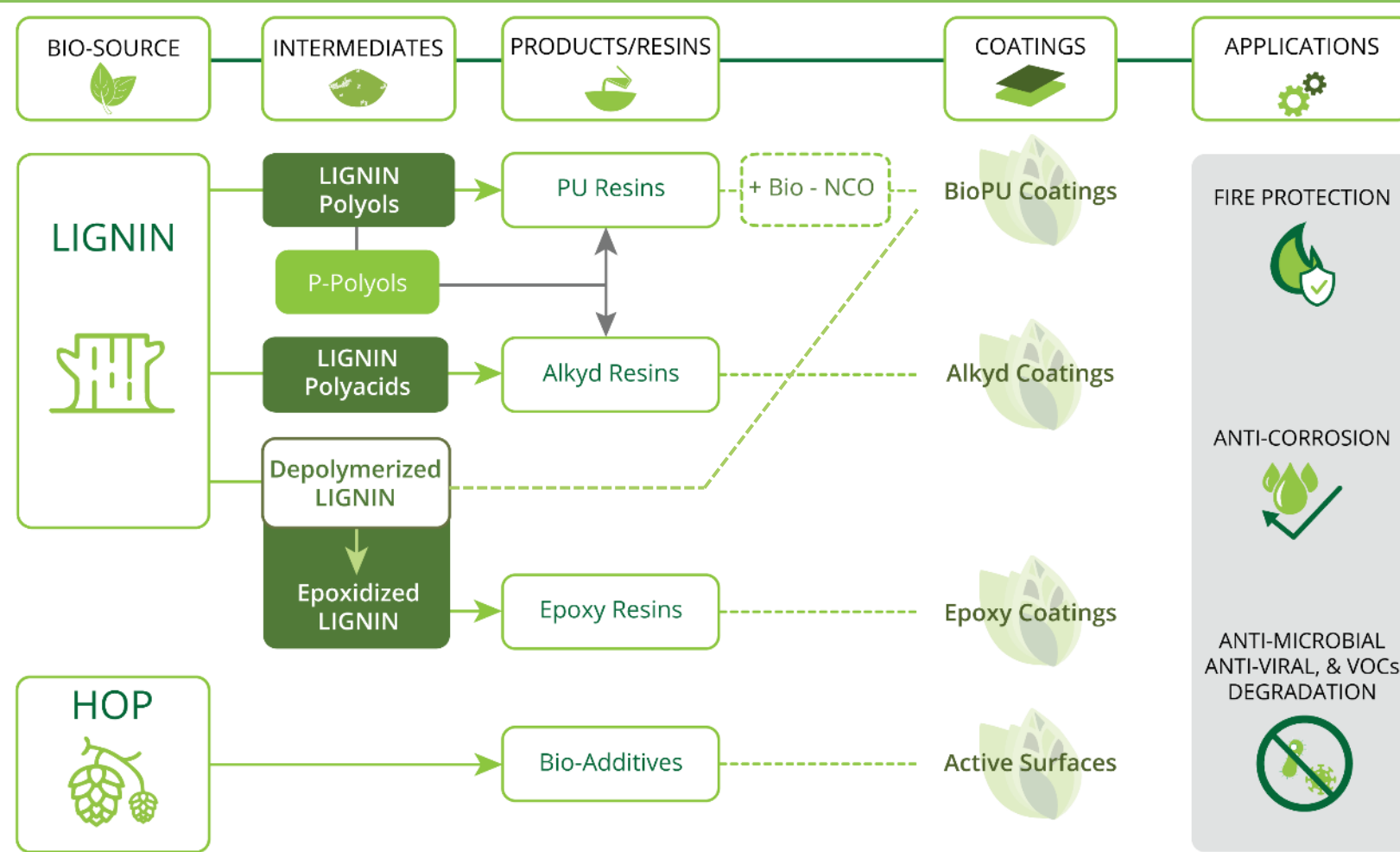
Lignin provides a sustainable alternative compared to traditional fossil-based raw materials, as it is obtained from agricultural, forestry, pulp, and paper industry wastes.



The LIGNICOAT value chain



Given the possibility of obtaining polymers and many products from lignin, it can be used as a building block for producing bio-resins for coatings.



The LIGNICOAT value chain



Polyurethane coating on wood based on lignin polyols



Epoxy on metal based on glycidylated lignin



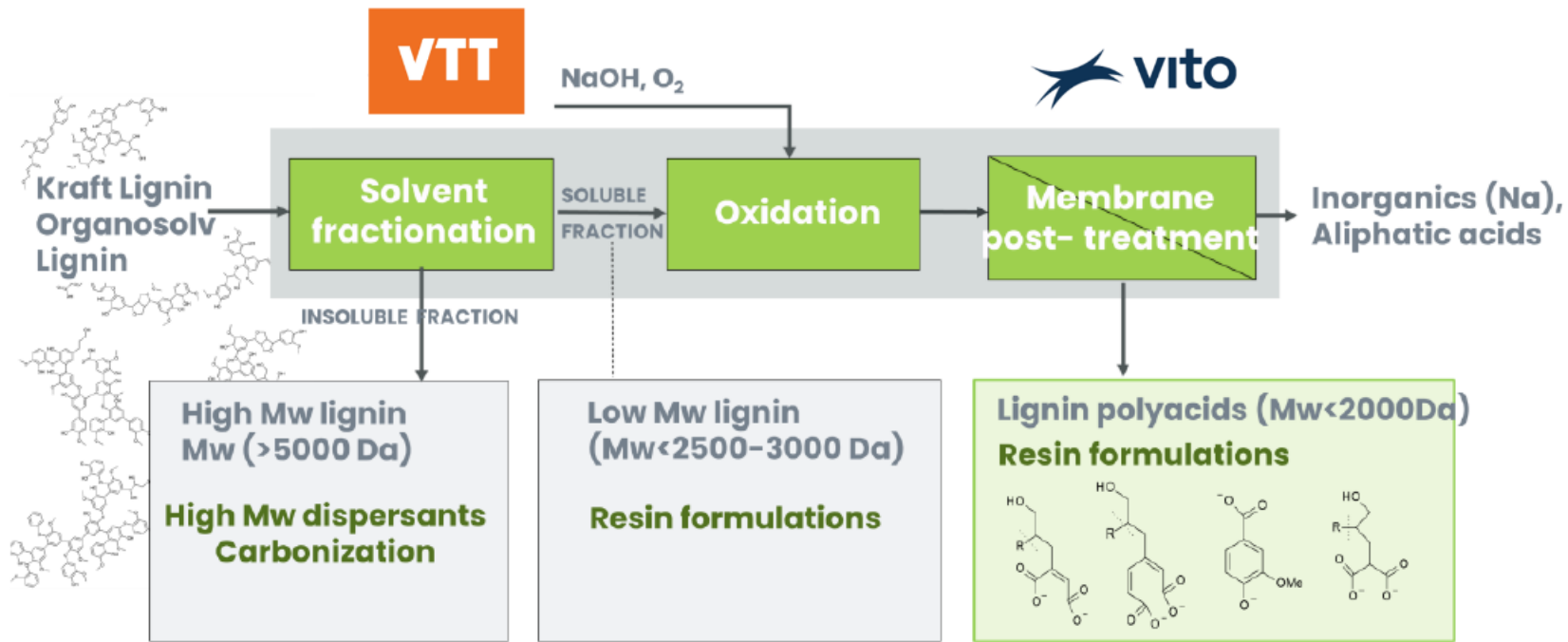
Alkyd resins on metal based on lignin polyacids

Bio-based content of LIGNICOAT coatings between 60-90%.

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Lignin polyacids & LigniOx process

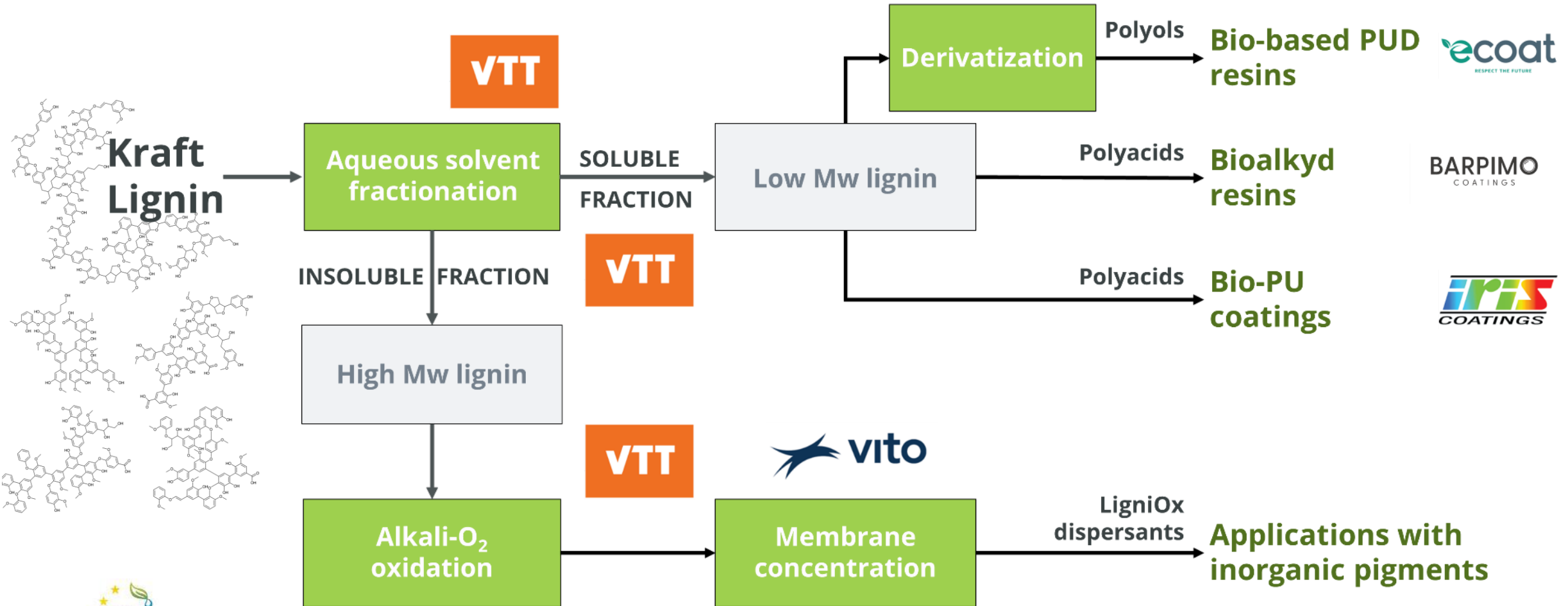


Fearon et al., NWBC 2022, DOI:10.32040/2242-122X.2022.T409

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Lignin polyacids & LigniOx process



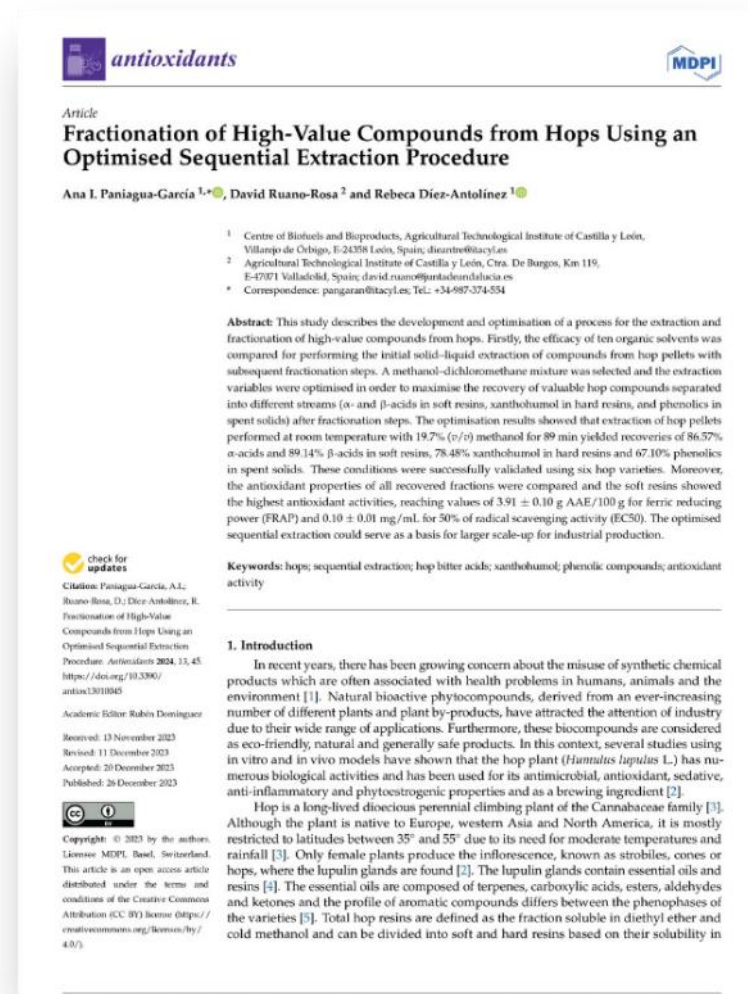
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Bioadditives based on hop



New natural compounds (from hop): Beta-acids, xanthohumol, or myricetin, to be incorporated into different coatings with proven antimicrobial activity

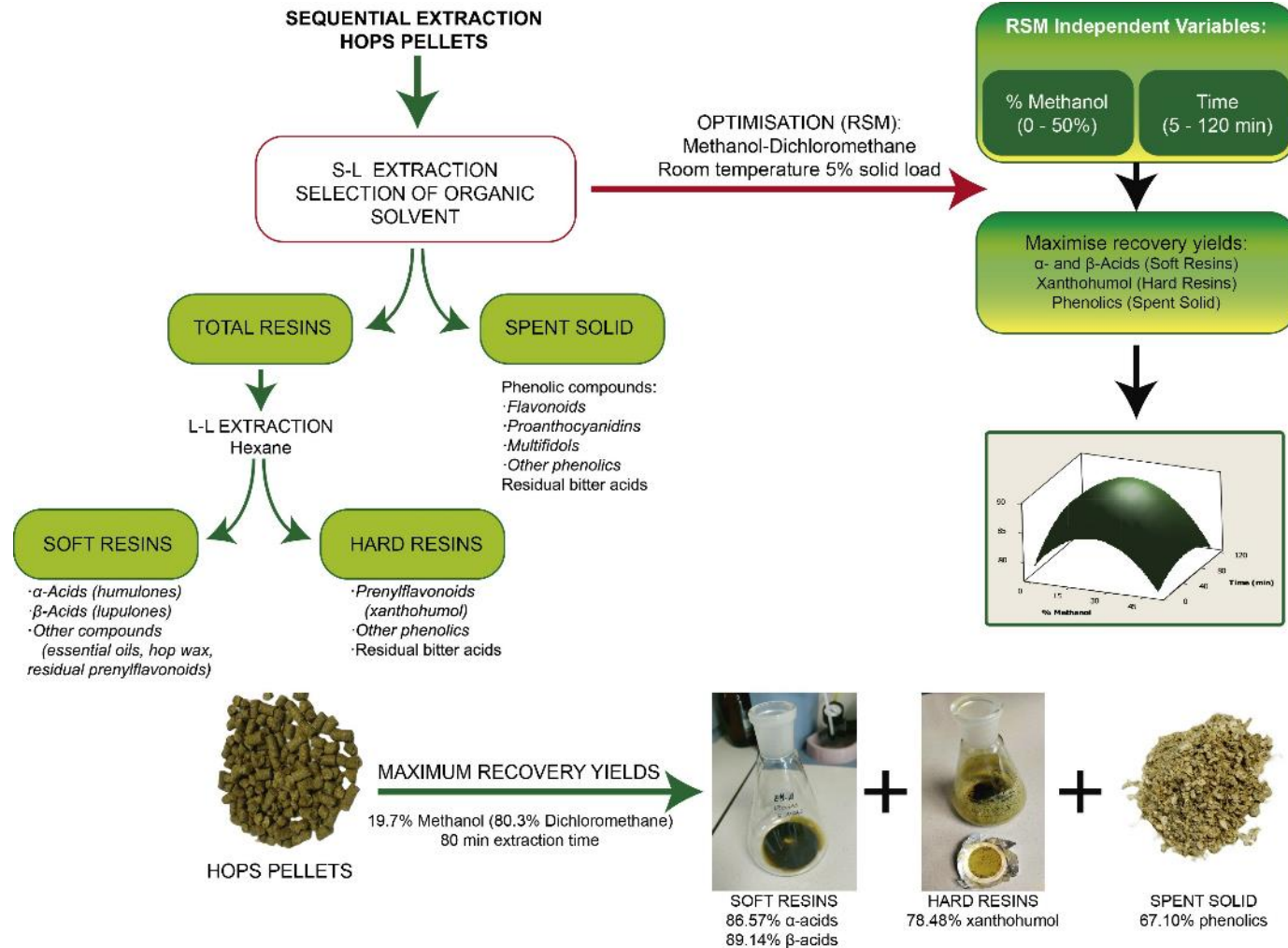


Paniagua-García et al., *Antioxidants* 2023, doi.org/10.3390/antiox13010045

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Bioadditives based on hop



- Optimized extraction led to high recoveries %
 - Soft resin: 87% α-acids, 89% β-acids
 - Hard resin: 78% Xanthohumol
 - Spent solid: 67% phenolics
- Extracted soft resins achieved better antioxidant properties than hard resins and spent solids.

Paniagua-Garcia et al., Antioxidants 2023,
doi.org/10.3390/antiox13010045

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LIGNICOAT applications – Wood



Fire retardant biocoatings based on bio-PUD-Alkyd resin



Applied on radiata pine



Applied on particleboard wood substrate

Cone calorimeter testing



Test 20 min
Heat flux 50 kW/m²



LIGNICOAT applications – Metal



Bio Alkyd (150 °C - 1 h)



Reference

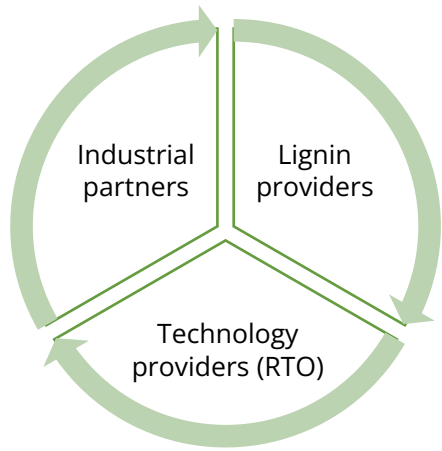
Humidity test

Salt spray test

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Impact beyond the coating industry



A new cross-sector interconnection



New bio-based chemicals (lignin polyols, epoxies, and polyacids) and resins (PUD, alkyd, epoxy).



Coating formulations 60-90% bio-based



1 new bio-based value chain



New job opportunities

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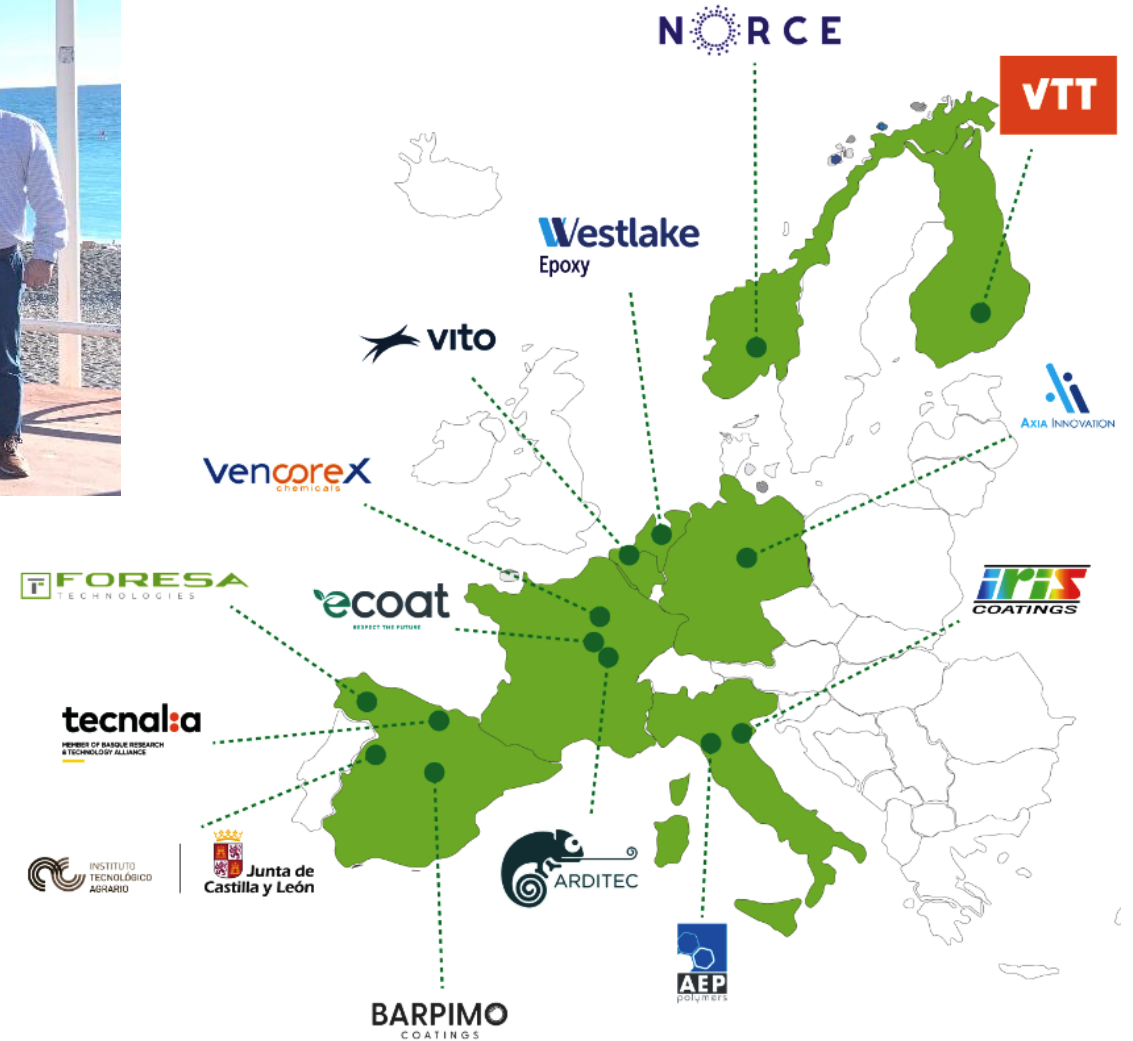


Meet our team



14 Partners from 8 countries

- 9 Industrials
- 4 RTOs
- 1 Non-profit



Stay updated and learn more



www.lignicoat.eu



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Thank you

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Friday, 09 Feb 2024