

NEWSLETTER

6TH ISSUE MAY 2024



LIGNICOAT

SUSTAINABLE COATINGS BASED ON LIGNIN RESINS AND BIO-ADDITIVES
WITH IMPROVED FIRE, CORROSION AND BIOLOGICAL RESISTANCE

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Join us on:

@LIGNICOAT



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.



Bio-based Industries
Consortium



Horizon 2020
European Union Funding
for Research & Innovation



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1. WELCOME

Welcome to the 6th Edition of the LIGNICOAT newsletter!

As we enter month 36 of our 42-month journey, we are excited to share the latest developments from the LIGNICOAT project. Coatings are integral to our lives, but their environmental impact and volatile organic compound (VOC) emissions have raised concerns. LIGNICOAT is developing sustainable solutions by harnessing lignin to produce bio-based coatings for the wood, metal, furniture, automotive, flooring, machinery, and paint industries.

In this edition, you will find highlights from the last months, including information on **project developments** and recent news, as well as some planned upcoming joint events, like an **LCA training** with the ALIGNED project and a **workshop on bio-resins and fire-retardants** with the THERMOFIRE and LIFE-VIABLE projects.



LIGNICOAT gathering at the M30 project meeting.



2. PROJECT UPDATE

CURRENT PROGRESS

85%



14 PARTNERS



42 MONTHS



8 COUNTRIES



8 WORK PACKAGES



EUR ~5 MILLION

TIMELINE

M30 Project Meeting

Nice, France

22-23 November 2023



LIGNICOAT M30 Meeting



[Download our press release to know more](#)

CBE Stakeholder Forum 2023

Brussels, Belgium

6-7 December 2023



LIGNICOAT at the CBESF23

M36 Project Meeting

Stavanger, Norway

19-20 June 2024

LIGNICOAT LCA Training with ALIGNED project

Online

17 September 2024

M42 Final Project Meeting

San Sebastian, Spain

November 2024

LIGNICOAT Workshop with THERMOFIRE and VIABLE projects

Online

15 October 2024



2. PROJECT UPDATE

Submitted Deliverables

In the implementation journey of the LIGNICOAT project, we have submitted several significant deliverables. Here are some of the key achievements the project has attained during the last months:

Number	Title	Lead Beneficiary	Nature
D2.4	1 kg of bio-isocyanate for Task 2.1	VENCOREX	Demonstrator
D7.3	Intermediate Technical Report	TECNALIA	Report

Deliverables submitted in the last months



Solvent-borne intumescent bio-coatings applied on a metal substrate. The bio-coatings reached an expansion ratio of up to 46 times. A good expansion ratio (i.e., around 50 x) is crucial for creating an insulating barrier and protecting structures or materials from fire damage.



3. WORK PROGRESS & RESEARCH HIGHLIGHTS

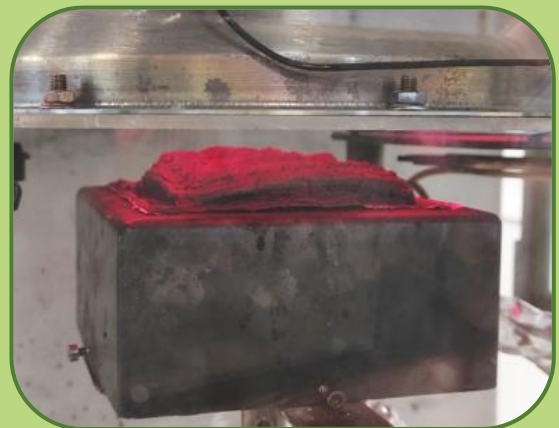
CONSORTIUM PROGRESS

In the last period, our project coordinator and leader of WP4 on biocoatings formulation, along with IRIS, have made progress on the development and application of **clear fire retardant biocoatings** for wood protection, including bio-resins from WP2 and lignin from WP1. Fire performance testing by **cone calorimeter tests** is being carried out in TECNALIA. Additionally, TECNALIA has been progressing in the development and application of antimicrobial/antiviral bio-coatings for metal substrates including WP2 bio-resin and WP3 bio-additives (thymol and hop soft resins). Samples have been sent to NORCE for **antiviral tests** and ITACyL for **antibacterial tests**.



Antimicrobial efficacy test of paints based on conventional alkyd (two columns on the left) and bio-alkyd (two columns in the middle).

The last two sets of columns on the right are the corresponding alkyd and bio-alkyd with thymol and soft-hop resins.



Cone calorimeter test of bio-PU fire retardant coating.



VITO is advancing on two fronts. First, they have continued working on optimizing process conditions (e.g., fresh vs. recycled methanol) for **continuous depolymerization** of the hydrolysis lignin. Such a process will then be upscaled at the LignoValue pilot plant.

Second, VITO performed a **proof-of-concept study** on balancing lignin content and hardener influence on the crosslink density of biobased epoxy resin coatings. The work has now been submitted to a scientific journal.



3. WORK PROGRESS & RESEARCH HIGHLIGHTS

CONSORTIUM PROGRESS

VTT, the Technical Research Centre of Finland, has been recently focused on the preparation of a manuscript on **kraft lignin fractionation** for the production of alkyd resins.

BARPIMO, leader of WP2 on bio-resins based on lignin, has recently focused on **improving the formulation of bio-coatings** in terms of visible impurities and humidity tests. Their tests were carried out on the fractionated lignin received from VTT; the next steps will also include the high molecular weight lignin from VITO.



LIGNICOAT bio-alkyd coating cured at 160°C for 1 hour. From left to right, the samples represent

- 1) *no test,*
- 2) *humidity test,*
- 3) *salt spray test.*

During the last period, ARDITEC kept collecting data for environmental, economic, and social assessments. As all the steps concerning the lignin intermediates and bio-based resins were previously assessed, ARDITEC is currently considering the first formulations of the coatings. The first results are already available for some coatings; they will be refined with more accurate data in the coming months. In parallel, ARDITEC is working on Deliverable 5.3: Preliminary report of SLCA of coating solutions. The final results for the three studies will be gathered in the last report in September 2024.





3. WORK PROGRESS & RESEARCH HIGHLIGHTS

CONSORTIUM PROGRESS

While continuously posting and monitoring the communication activities of the project, AXIA has been focusing on the organization of **clustering activities**, which will involve an online workshop with the THERMOFIRE and VIABLE project and an online LCA training with ALIGNED. Meanwhile, AXIA is also working on the competition analysis and **development of business plans** for the industrial partners as part of the project exploitation strategy and in view of the final deliverable on the **Plan for Exploitation and Dissemination of the Results** (PEDR).



AEP has started the **formulation work** on the first batch of **lignin-based epoxy** prepared by WESTLAKE, in combination with a melamine-type crosslinker previously selected in fossil-based benchmark resins. **Promising results** (uniform, fully cured) **have been obtained addressing high Peak Metal Temperature (PMT) formulations**. The focus is now on working on a further resin batch to develop higher reactivity, low PMT lignin-based formulations with similar properties with respect to commercial benchmarks.

FORESA Technologies has been preparing wood board coatings with **bio-modified melamine resin** and **antimicrobial bio-additives** from WP3 (Bio-additives for coatings). These coatings are being tested according to different standards.



VENCOREX has not performed any additional work as the task on the development of bio-isocyanates was completed last year. However, their commercial and in-development bio-isocyanates have been suggested for use in the formulation of bio-polyurethane dispersions.

ITACyL has successfully **published a manuscript** in the Antioxidants journal on the process development and optimization for **extracting valuable compounds from hops**, achieving high recovery rates of α -acids, β -acids, xanthohumol, and phenolics. Moreover, ITACyL is currently **testing the biocoatings** received from TECNALIA for **antimicrobial properties**.





3. WORK PROGRESS & RESEARCH HIGHLIGHTS

CONSORTIUM PROGRESS

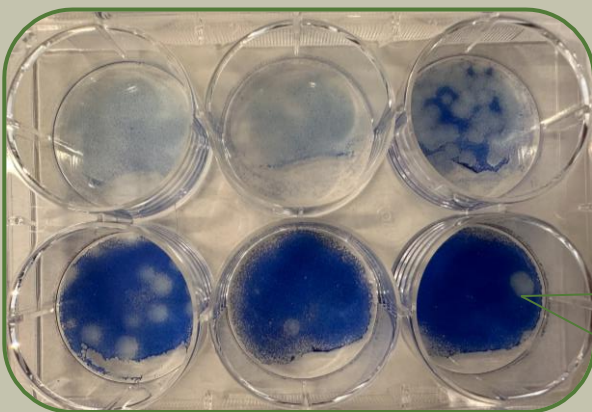
IRIS Coatings is actively involved in the **development of coatings**, including **bio-resins** and **flame-retardant** products. Their work has been mainly focused on developing formulations for intumescent and flame-retardant coatings for wood applications.



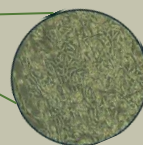
Differences in colour and transparency of LIGNICOAT alkyd or kraft lignin bio-coatings with isocyanate (H-NCO) and flame-retardant additives (FR).



NORCE, leader of WP3 on bio-additives for coatings, has recently received some biocoatings on both wood and metal from FORESA Technologies and TECNALIA and **performed antiviral tests according to ISO 21702**. Preliminary results show a **significant reduction in viral particles** for the different antivirals tested.



Plaque assay of Influenza A virus (H3N2)-infected Madin-Darby canine kidney (MDCK) cells. MDCK cells were plated in a 6-well plate and left to attach for 3 days. Serial dilutions of the virus were prepared (10⁻⁵ – 10⁻¹⁰). The total number of plaque-forming units (PFU) was determined by dividing the average number of plaques by the dilution factor by the volume added.



Influenza A virus (H3N2)-infected MDCK cells.



3. WORK PROGRESS & RESEARCH HIGHLIGHTS

CONSORTIUM PROGRESS

WESTLAKE Epoxy has been working on improving the **glycidation protocol for lignin depolymerization**, a crucial step in the production of lignin-based epoxy resins.



ECOAT has recently synthesized and delivered to TECNALIA and IRIS Coatings two different types of **bio-polyurethane dispersions based on lignin**. The goal is to formulate **water-based bio-coatings** for fire protection, rather than the conventional solvent-based.



Bio-PUD resins developed by ECOAT.



4. NEWS

M30 Consortium Meeting in Nice, France

The LIGNICOAT consortium had its sixth meeting at the 30-month mark in Nice, France, hosted by ARDITEC Association. Discussions revolved around project progress, including deliverables and future steps as the project heads into its final year.



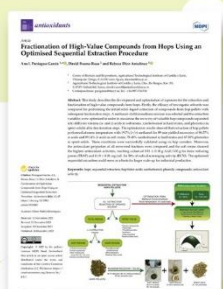
The two-day event began with project management discussions led by TECNALIA and was followed by sustainability assessment talks by ARDITEC Association. Highlights included advancements in wood-based coating formulations, optimization of coating application processes, and the development of bio-additives for coatings. The meeting concluded with a presentation on the progress of bio-coating formulation.

LIGNICOAT Publication in Antioxidants Journal



Article Publication

Fractionation of High-Value Compounds from Hops Using an Optimised Sequential Extraction Procedure



The LIGNICOAT project is excited to share that its partner, ITACyL (Agricultural Technological Institute of Castilla y León), has recently published a research article titled **“Fractionation of High-Value Compounds from Hops Using an Optimised Sequential Extraction Procedure”** in the Antioxidants journal (MDPI, Q1, IF: 7).

The article details the development and optimization of a process for extracting valuable compounds from hops, achieving impressive recovery rates of α -acids, β -acids, xanthohumol, and phenolics.

This **optimized sequential extraction method**, validated across **six hop varieties**, demonstrates promising potential for industrial-scale production. The study's significance lies in its contribution to extraction methodology for these high-value compounds, paving the way for broader industrial applications. The article is open access, welcoming all interested individuals to explore its findings and implications. To **download and read the article for free**, click [here](#).



4. NEWS

4th Press Release in Pitture e Vernici

The project received coverage in the magazine 'Pittura e Vernici European Coatings' (Issue 1 – January/February). Highlighted was the M30 meeting held last November in Nice (France), hosted by ARDITEC Association. This gathering held particular significance as the project reached its final year.

For the complete press release, please access it [here](#).



Upcoming M36 Consortium Meeting in Stavanger



Scheduled for June 19 to 20, 2024, the forthcoming M36 LIGNICOAT project meeting is set to take place in Stavanger, Norway. Over the course of two days, the event will be hosted by NORCE, the Norwegian Research Centre.

On the first day, the Consortium will visit the **Norwegian Bioprocessing and Fermentation Centre** situated in Risavika. On June 20th, the consortium meeting will take place, focusing on

presentations from different partners on lignin intermediates and bio-resins, biocoatings formulation, LCA, and project exploitation and dissemination. The meeting will conclude with updates on project management from the project coordinator, TECNALIA. This meeting holds particular significance as it represents an important milestone in the project's timeline, entering its **last six months**.



4. NEWS

Online Training On LCA with ALIGNED project

On **September 17th**, between 09:00 and 12:30 (CEST), LIGNICOAT will host a joint online training session focusing on "**Life Cycle Assessment (LCA) for Bio-based Products**" in partnership with the ALIGNED project. This session will offer a valuable opportunity to explore the crucial components of LCA for bio-based materials and coatings.

The training will consist of **three sessions**, each featuring

theoretical background and **practical examples**, followed by interactive Q&A sessions. In an effort to tailor the training to your needs, we have prepared a survey with a list of potential topics to be covered.

This training session is designed for professionals and stakeholders with expertise in bio-based materials and a keen interest in Life Cycle Assessment (LCA). We encourage your participation in the survey to indicate your preferences and register for the training. Please take a moment to **complete the survey and register** ([survey link](#)).



Online Training on
**LCA for
BIO-BASED
PRODUCTS**

Presented by



Joint Workshop LIGNICOAT-THERMOFIRE-VIABLE



**JOINT ONLINE WORKSHOP
BIO-RESINS &
FIRE-RETARDANT
ADDITIVES
FOR COATINGS**

With the participation of



On **October 15**, from 09:00 to 13:00, LIGNICOAT, in partnership with **THERMOFIRE** and **VIABLE** projects, will host an online workshop focusing on the intersection of **bio-resins** and **fire-retardant** additives for **coatings**.

The event will feature presentations on **bio-resins**, the role of **fire-retardant additives**, and **real-world applications**, concluding with

a roundtable discussion. Tailored for professionals and stakeholders in bio-based materials, including fire-resistant materials and coating manufacturers. Stay tuned for registration details and updates.



5. EVENTS

ATTENDED EVENTS

tecna:la

MEMBER OF BASQUE RESEARCH
& TECHNOLOGY ALLIANCE



AXIA INNOVATION

LIGNICOAT at the Circular Bio-Based Stakeholder Forum 2023

6-7 December 2023, Brussels (Belgium)

The LIGNICOAT project showcased its innovative coating solutions at the Circular Bio-based Stakeholder Forum 2023 (CBESF23) in Brussels, Belgium, organized by the Circular Bio-based Europe Joint Undertaking (CBE JU). Representatives from AXIA Innovation and TECNALIA engaged with stakeholders to illustrate and explain the project and its potential for addressing the bio-based coatings sector.



The forum aimed to stimulate demand, boost investments, and ensure access to finance for circular bio-based solutions. Key discussions highlighted the growing demand for bio-based products, the need for improved communication and legislation, and the importance of collaboration and community building. Stakeholders emphasized market-driven innovation and increased financing for replication.

To know more about the event, check out this brief [video teaser](#).





5. EVENTS

ATTENDED EVENTS

Westlake
Epoxy

LIGNICOAT at the 10th Biorizon Annual Event 30 November 2023, Rotterdam (The Netherlands)

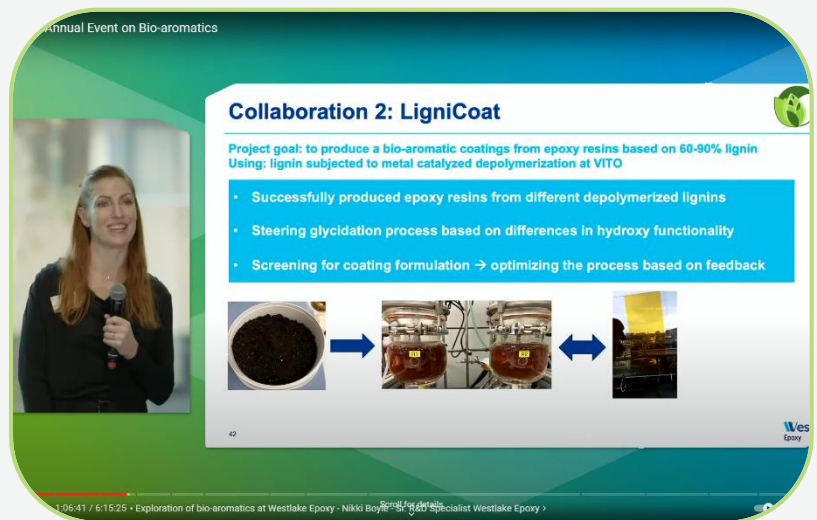
Nikki Boyle, Senior R&D Specialist at Westlake Epoxy, highlighted the advancements in the LIGNICOAT project during the 10th Biorizon Annual Event on Bio-aromatics, organized by project partner VITO on November 30. Westlake Epoxy receives various types of **depolymerized lignin** from VITO and observed how differences in the starting material affect their **epoxy resin production process**.

In LIGNICOAT, where the objective is to create bio-coatings from epoxy resins containing 60-90% lignin, Westlake also conducts testing and formulates coatings, which are then passed on to partner AEP Polymers.

During the presentation, Boyle showcased the colored coatings obtained from VITO's depolymerized lignin.

The **2024 goal is to scale up production to kilogram quantities**, a significant step towards sustainable and bio-based coatings technology for the LIGNICOAT project.

To watch Westlake Epoxy's presentation on LIGNICOAT, click [here](#).





5. EVENTS

ATTENDED EVENTS

tecna:ia

MEMBER OF BASQUE RESEARCH
& TECHNOLOGY ALLIANCE



LIGNICOAT at the BIC Matchmaking 2024

8 February 2024, Brussels (Belgium)

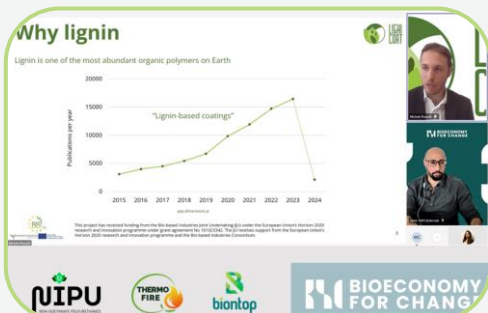
LIGNICOAT partners TECNALIA and ARDITEC Association participated in the Bio Industries Consortium (BIC) Matchmaking 2024 event. At the event, partners showcased LIGNICOAT technologies through a poster presentation. The Matchmaking event serves as a platform for industry, academia, and stakeholders to convene and explore partnerships and collaborations in the bio-based industry.

This year, the event attracted over 250 participants. To know more about BIC, visit their [website](#).



Presentation at the Webinar on the Future of Biobased Polymers in Europe

9 February 2024, Online



On February 9th, AXIA Innovation delivered a 15-minute presentation in an online webinar titled “**Biobased Polymers in Europe: What’s New?**” organized by Bioeconomy For Change (B4C). LIGNICOAT’s [presentation](#) gathered significant interest from the **100 participants**. It provided valuable insights into the project’s advancements and technical details on lignin-based coatings and bio-additives derived

from hops for antimicrobial purposes. To delve deeper into our recent publications, download:

- "[Lignin-Based Polyacids to Substitute Fossil-Based Materials in Coatings Formulations](#)" by Fearon et al.,
- "[Fractionation of High-Value Compounds from Hops Using an Optimised Sequential Extraction Procedure](#)" by Paniagua-Garcia et al., Antioxidants 2023



5. EVENTS

ATTENDED EVENTS



LIGNICOAT Presents at CHAMPION and PERFECOAT Stakeholder Event

24 April 2024, Brussels (Belgium)

At the stakeholder event titled “**Bio-based Innovations for Industrial Applications**” on April 24 in Brussels, Belgium, the LIGNICOAT project showcased its progress on “Lignin-based clear biocoatings for fire protection on wood substrates.” Organized jointly by the **CHAMPION** and **PERFECOAT** projects, the event convened **over 120 stakeholders**, fostering collaboration and addressing challenges in the bio-based sector.



Representatives from LIGNICOAT, including partner IRIS COATINGS responsible for intumescent and fireproofing reactive coatings, and dissemination and exploitation partner AXIA INNOVATION, actively engaged with participants, sharing insights and exploring synergies within the bio-based community.

IRIS Coatings delivered a presentation on the latest findings regarding lignin-based fire retardancy on wood, complemented by a comprehensive poster showcasing heat release rate and environmental performance (from LCA by ARDITEC Association) of different coating solutions (with and without LIGNICOAT coatings).

For further details, you can download the presentation and poster in PDF format:

- Presentation: “[Lignin-based Clear Biocoatings for Fire Protection of Wood](#)”
- Poster: “[Clear Fire-Retardant Lignin-Based Biocoatings](#)”

UPCOMING EVENTS

Event	Date	Place	Activity
9th International Conference of Social Life Cycle Assessment (S-LCA 2024)	28-31 May 2024	Curitiba, Brazil	Submitted abstract from ARDITEC: <i>Social Life Cycle Assessment of Innovative Lignin-Based Chemical Materials for Resins and Coatings</i>
Polymers 2024	28-31 May 2024	Athens, Greece	Poster from AXIA on "Bio-based Sustainable Coatings with Lignin Resins for Enhanced Performance and Environmental Impact"
Biobased Coatings Europe 2024	5-6 June 2024	Valencia, Spain	Oral presentation from VITO
International Conference on Renewable Resources & Biorefineries (RRB 2024)	5-7 June 2024	Brussels, Belgium	Oral presentation from VITO on <i>Fractionation of Kraft lignin for production of alkyd resin coatings.</i> Poster from VTT on <i>Production of Dispersants for Special Carbon Black by Oxidization of Fractionated Kraft Lignin</i>
Renewable Materials Conference 2024	11-13 June 2024	Cologne, Germany	Poster from TECNALIA and VITO
Lignin Gordon Research Conference	14-19 July 2024	Easton, MA, United States	Poster from ARDITEC on "Life Cycle Assessment of lignin-based coatings for several applications"
17th European Workshop on Lignocellulosic and Pulp (EWLP 2024)	26-30 August 2024	Turku, Finland	VITO participation
IV Jornadas Espanolas de Biocatalisis	5-6 September 2024	San Sebastian, Spain	Presentation from NORCE on <i>Marine biotechnology for a circular bioeconomy</i>



5. EVENTS

UPCOMING EVENTS

Event	Date	Place	Activity
LIGNICOAT-ALIGNED LCA Training	17 September 2024	Online	Clustering Activity
LIGNICOAT-THERMOFIRE- VIABLE Joint Workshop	15 October 2024	Online	Clustering Activity
American Institute of Chemical Engineers (AIChE) Annual Meeting	27-31 October 2024	San Diego, USA	Presentation from VTT on <i>Fractionation of Kraft Lignin for Production of Alkyd Resin for Bio- based Coatings</i>
International Lignin Conference	18-19 November 2024	Paris, France	Oral presentation from VITO
Paints & Coatings	20-21 November 2024	Barcelona, Spain	Presentation from TECNALIA on <i>Flame-Retardant Clear Biocoating for Wood</i>



6. CONTACT INFO

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THE LIGNICOAT TEAM



Our Team is composed of a multidisciplinary consortium that constitutes an excellently balanced team in terms of knowledge, expertise and experience with a total of 14 partners from 8 countries across Europe. The consortium is counting on the participation of 9 industrial partners for ensuring the exploitation of the outcomes of the technological challenges of LIGNICOAT.



Join us on:



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Bio-based Industries Consortium



Horizon 2020
European Union Funding
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