CEN – European Committee for Standardization
CENELEC – European Committee for Electrotechnical Standardization

CEN Workshop ‘Ultrasound-assisted production of lignin nanoparticles’

Workshop description form

- PART A – Workshop Summary
- PART B – Project Plan

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PART A – Workshop SUMMARY

1	WS details		
1.1.	**Organization**	☒ CEN ☐ CENELEC ☐ Joint with ☐ CEN lead ☐ CENELEC lead	
1.2.	**Title**	CEN/ WS 'Ultrasound-assisted production of lignin nanoparticles'	
1.3.	**Scope**	This CEN-CENELEC Workshop intends to develop a CEN-CENELEC Workshop Agreement (CWA) related to the process production of lignin nanoparticles using an environmentally sustainable ultrasound-assisted process.	
1.4.	**Does this WS stem from an EU Research project?**	☒ YES Name of the project: European Sustainable BIObased nanoMAterials Community (BIOMAC) Grant number: 952941 End date 30-06-2025 ☐ NO	
1.5.	**Financial support**	☒ EU Research project ☐ EC/EFTA Grant reference: Type here ☐ Other Specify, if needed: Type here	
1.6.	**WS Proposer**	Name: Organization: Postal address: Email: Phone: Webpage: Contact person (name and email):	Sofia P. Makri Creative Nano Tatoiou 43, 14 451 Athens, Greece s.makri@creativenano.gr (+30) 211 4020804 https://www.creativenano.gr/ Sofia P. Makri (s.makri@creativenano.gr)
	WS Proposed Chair	Name: Organization: Postal address: Email: Phone: Webpage: Contact person (name and email):	Chiara Bearzotti European Bioplastics e.V. Marienstraße 19/20, 10117 Berlin euprojects@european-bioplastics.org 00493028482350 https://www.european-bioplastics.org/ Chiara Bearzotti (euprojects@european-bioplastics.org)
	WS Proposed Vice-Chair	Name: Organization: Postal address: Email: Phone: Webpage: Contact person (name and email):	Dr. Alexandros-Zoikis Karathanasis Creative Nano Tatoiou 43, 14 451 Athens, Greece s.makri@creativenano.gr (+30) 211 4020804 https://www.creativenano.gr/ Alexandros-Zoikis Karathanasis (a.karathanasis@creativenano.gr)

1.7.	**WS Secretariat**	Organization: Postal address: Email: Phone: Webpage: WS Secretary name: Email: Phone:	UNE – Spanish association for standardization Calle Génova 6, Madrid (Spain),28004 info@une.org +34 915 294 900 www.une.org Leticia Roubelat Marqués lroubelat@une.org +34 660 37 53 07
1.8.	**CEN and CENELEC Management Centre (CCMC) contact**	Organization: Postal address: Webpage: CCMC Project Manager name: Email: Phone:	CEN and CENELEC Rue de la Science 23B - 1040 Brussels, Belgium https://www.cencenelec.eu/Pages/default.aspx Type here Type here Type here
1.9.	**Tentative date and place of the Kick-off Meeting**	Date: 10-02-2025	Place: Online
1.10.	**Does the proposed Workshop fall within the scope of existing CEN and/or CENELEC Technical Bodies?[1]**	☒ YES Specify: CEN/TC 352 Nanotechnologies ☐ NO	
1.11.	**Are there other Technical Bodies or Joint Advisory and Coordination Groups potentially interested in the Workshop? ?[2]**	☒ YES Specify: ISO/TC 229 Nanotechnologies; ISO/TC 6 Paper, board and pulps; CEN/TC 172 Pulp, paper and board ☐ NO	
1.12.	**Are the following aspects affected?**	Safety matters Management system aspects Conformity assessment aspects Security matters	YES[3] ☐ NO[7] ☒ YES[4] ☐ NO ☒ YES[5] ☐ NO ☒ YES[6] ☐ NO[8] ☒
		Add information/explanations if Management System aspects and Conformity Assessment aspects are affected: Type here	
2	**WS Deliverables**		
2.1.	**CWA #1**		
2.1.1	**Title**	☐ Same as WS title (1.2) ☒ Other: Ultrasound-assisted process for the production of lignin nanoparticles	

[1] Part A and Part B of this form shall be sent by the WS secretary to the secretary of the Technical Bodies identified in this section to inform them about the creation of the WS and register any possible objection within 30 days (45 during the holiday period).

[2] Part A and Part B of this form should be sent by the WS secretary to the Bodies identified in this section to inform them about the creation of the WS.

[3] Work on the proposed CEN and/or CENELEC Workshop shall not be initiated.

[4] The CEN and/or CENELEC Workshop proposal shall be submitted to the CEN/CENELEC BT(s) for decision.

[5] CEN-CENELEC Internal Regulations - Part 3, Clause 33 applies.

[6] For projects dealing with security matters the security risk analysis provided in Annex I shall be carried out.

[7] See Note 2 in CEN-CENELEC Guide 29, Clause 3.

[8] See Note 2 in CEN-CENELEC Guide 29, Clause 3.

2.1.2	**Scope**		This CWA specifies a process that aims to standardize the production of lignin nanoparticles through an ultrasound-assisted method that emphasizes environmental sustainability.
2.1.3	**Does the proposed CWA conflict with a published EN**	☐ ☒	YES Specify: Type here NO

PART B – Project Plan

Draft project plan for public commenting (Version 1.0)

This draft project plan is intended to inform the public of a new Workshop. Any interested party can take part in this Workshop and/or comment on this draft project plan by sending an email to the WS secretary.

All those who have applied for participation or have commented on the project plan by the deadline will be invited to the kick-off meeting of the Workshop on **2025-02-10 (tentative)**.

1 Workshop proposer and potential Workshop participants

1.1 Workshop proposer

Alexandros Karathanasis and Sofia Makri (Creative Nano PC, Cnano)

Creative Nano is a research intensive and commercialization SME providing technological solutions in the field of materials' nanoscience and nanotechnology. Cnano offers a range of services including surface treatment, synthesis, characterisation and handling of nanomaterials, environmental safety consulting to various industries.

Creative Nano is partner of the H2020 project "European Sustainable BIObased nanoMAterials Community", in short BIOMAC. BIOMAC has received funding from the European Union's Horizon 2020 research and innovation framework programme under grant agreement No 952941.

The creation of this CEN Workshop was identified by the Creative Nano, European Bioplastics and Aristotle University of Thessaloniki, the coordinator of the BIOMAC project consortium, as a very useful way for the translation of its results to marketable solutions.

This workshop will be used for the dissemination of the project and its results for reaching stakeholders on national, European and international level. Creative Nano will lead the development of a CWA in order to bring this ultrasound-assisted process for the production of lignin nanoparticles closer to the market and to spread the technological advance.

1.2 Potential participants

This CWA will be developed in a Workshop (temporary body) that is open to any interested party. The participation of the following persons/organizations would be helpful and is desired. It is recommended that:

- Researcher institutions in material science
- Industries in the field of polymers and nanotechnology
- Policymakers focused on sustainability and innovation
- Companies and organizations in the biobased materials sector

take part in the development of this CWA.

Participation is expected from the following organizations:

- European Bioplastics e.V. (EUBP)
- Politecnico di Milano (Polimi)
- Aristotle University of Thessaloniki (AUTH)
- Asociación De Investigación de Materiales Plásticos y Conexas (AIMPLAS)
- NOVAMONT S.p.A

2 Workshop objectives and scope

2.1 Workshop background

Today, approximately 60-70% of biomass is mainly used in the global energy sector, particularly utilized in combustion processes for heating, electricity generation, and as liquid fuel for transportation. This significantly contributes to renewable energy targets and the reduction of fossil fuel dependency. However, this approach primarily focuses on biomass as a source of energy, overlooking the potential of biomass byproducts such as lignin and cellulose, which can be converted into valuable chemicals and materials. More specifically, lignin, a complex organic polymer, is often regarded as a low-value byproduct of the paper and pulp industry. Yet, it holds considerable promise for creating high-value products, including bioplastics, resins, adhesives, and carbon fibres. This not only enhances the economic value of biomass but also supports a more sustainable and circular economy.

The importance of valorizing biomass byproducts extends into the realm of nanotechnology, particularly through the innovative production of nanolignin as a renewable and biodegradable alternative to conventional nanoadditives. The production of nanolignin encompasses a variety of approaches, broadly categorized into chemical and physical methods, each with distinct pathways and implications for scalability and environmental impact. Chemical routes, while prevalent and effective, face challenges in upscaling and environmental sustainability due to the heavy reliance on costly and potentially hazardous chemicals and solvents.

Physical methods such as ultrasonication, homogenization, and ball-milling are more environmentally benign but less developed. Recent advancements in green chemistry have highlighted ultrasonication as a potent method for producing nanolignin. Ultrasonication, known for its low energy requirements and minimal environmental footprint, aligns with the principles of green chemistry. The application of nanolignin as a nanoadditive in bio-based polymers represents a significant advancement in the field of sustainable materials science. It offers a pathway to enhance the properties of polymers, including mechanical, barrier, antioxidant, and thermal properties, as well as biodegradability. By advancing the use of nanolignin in this capacity, industries like food packaging, agriculture, and electronics can move closer to achieving eco-friendly solutions across a broad spectrum of applications, underscoring the role of innovative materials in the transition towards a more sustainable future.

This initiative arises from the H2020 BIOMAC project (European Sustainable BIO-based nanoMAterials Community, Grant Agreement number 952941). The project is working on establishing an Open Innovation Test Bed (OITB), a true collaborative ecosystem where technologies and solutions utilising nano-enabled bio-based materials (NBMs) will be upscaled and prepared for market applications. In this context, this CEN workshop proposal aligns with the EU's commitment to reducing the environmental impact of products throughout their

lifecycle, supporting the H2020 BIOMAC project's aim to boost and sustain innovation in the field of European bio-economy industries, by reducing the time-to-market of novel nanotechnologies, thus reducing cost and risks. This promotes sustainability and energy efficiency in line with European Circular Economy Action Plan. [9]

2.2 Existing related activities

Cnano, in collaboration with AUTH, has prepared and submitted a patent application titled "ULTRASOUND-ASSISTED PROCESS FOR THE PRODUCTION OF LIGNIN NANOPARTICLES" to the European Patent Office (EPO) under application number EP23176062.0 on May 23, 2023. This submission is a direct outcome of the activities carried out within the context of the BIOMAC project, including the upgrading and fine-tuning of its Pilot Line. The patent application is currently under review by the European Patent Office (expected resolution in November 2024).

Furthermore, Cnano, in collaboration with AUTH and other BIOMAC project partners such as AIMPLAS, has submitted three scientific papers:

1 "Effect of Micro- and Nano-Lignin on the Thermal, Mechanical, and Antioxidant Properties of Biobased PLA–Lignin Composite Films," published in Polymers 2022, 14(23), 5274; https://doi.org/10.3390/polym14235274.
2 "Poly (Lactic Acid) Composites with Lignin and Nanolignin Synthesized by In Situ Reactive Processing," published in Polymers 2023, 15(10), 2386; https://doi.org/10.3390/polym15102386.
3 "Structure-Properties Relationships in Renewable Composites of Poly (lactic acid) Reinforced by Low Amounts of Micro- and Nano- Kraft-Lignin," Soft Matter, 2024,20, 5014-5027, https://doi.org/10.1039/D4SM00622D

Another manuscript is under preparation and will be submitted to the Polymers MDPI under the title "Effect of Lignin's Particle Size on the Properties of PLA Composites Prepared by In Situ Ring-Opening Polymerization."

2.3 Scope of the proposed Workshop

The planned Workshop aims to develop a CEN Workshop Agreement (CWA) that specifies a process to produce nanolignin using an ultrasound-assisted method, emphasizing the exclusive use of water as the solvent and the elimination of harmful chemicals. This process will ensure that procedure is reproducible, scalable, and can be applied across different laboratory and pilot settings.

This process will cover all stages from raw material handling to the final production of nanolignin, ensuring the end product has controlled size and properties.

It will specify essential technical parameters, including sonication intensity, duration, temperature settings, and lignin concentrations necessary to produce high-quality nanoparticles. Quality control measures will be suggested to verify that the nanoparticles meet specifications for size, dispersion, and morphological characteristics, to enable their industrial application.

[9] COM (2020) 98 final: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

It will include guidelines for escalating the production of nanolignin from laboratory to pilot scales. This includes the design and operation of a specialized ultrasound-assisted pilot line, coupled with guidelines to optimize the process for enhanced efficiency and productivity at larger scales.

The workshop is intended for researchers, material scientists, industry professionals in the field of polymers and nanotechnology, policymakers focused on sustainability and innovation, and stakeholders in the biobased materials sector. It aims to provide valuable insights for those involved in the development, application, and regulation of sustainable nanomaterials.

The workshop does not apply to pharmaceutical companies and medical applications, where stringent Good Manufacturing practices (GMPs) govern production processes to ensure product safety and efficacy for direct human application.

3 Workshop programme

3.1 General

The kick-off meeting is planned to take place on 2025-02-10, online as virtual meeting. A draft for public commenting will be published for 30 days, provided that timeframe permits.

After the kick-off meeting, the necessary number of Workshop meetings (kick-off meeting and Workshop meetings) and web conferences will be held, during which the content of the CWA will be discussed, agreed and approved. The number of agreed meetings will be arranged as needed in the drafting and agreement process. Online work will be preferred to improve the sustainability of this work.

The working language (language of meetings, minutes, etc.) of the WS will be English. The CWA will be written in English.

3.2 Workshop schedule

Table 1: Workshop schedule (preliminary)

CEN/CENELEC Workshop	Oct24	Nov24	Dec24	Jan25	Feb25	Mar25	Apr25	May25	Jun25	Jul25
Initiation										
1. Workshop description form submission and TC response										
2. Open commenting period on draft project plan (mandatory)										
Operation										
3. Kick-off meeting										
4. CWA(s) development										
5. Open commenting period on draft CWA(s) (optional)										
6. CWA(s) finalized and approved by Workshop participants										
Publication										
7. CWA(s) publication										
Dissemination										
Milestones				K	V	V	V/A		P	P D

Legend

K Kick-off

V Virtual Workshop meeting

A Adoption of CWA

P Publication of CWA

D Online distribution of CW

4 Resource planning

Both registration and participation at the Workshop here are free of charge. The management costs of the Workshop will be covered by resources from the BIOMAC project (GA 952941).

The use of electronic meetings will be preferred. Nevertheless, in the case of physical meetings, they will be held in Europe and each participant must bear his/her own costs for travel, accommodation and subsistence.

The CWA will be published by CEN/CENELEC and made publicly available through CEN/CENELEC and the different standardization Institutes in the member states at normal costs in line with the guidelines in CEN/CENELEC Guide 10. It is foreseen that the CWA can be also freely downloaded from the CWA Download Area on the CEN/CENELEC webpage.

The copyright of the final CWA will be at CEN/CENELEC. The final document will include the following paragraph: "Results incorporated in this CEN Workshop Agreement received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 952941".

5 Workshop structure and rules of cooperation

5.1 Participation in the Workshop

The Workshop will be constituted during the kick-off meeting. By approving this project plan, the interested parties declare their willingness to participate in the Workshop and will be formally named as Workshop participants, with the associated rights and duties. Participants at the kick-off meeting who do not approve the project plan are not given the status of a Workshop participant and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the Workshop.

As a rule, the request to participate in the Workshop is closed once it is constituted. The current Workshop participants shall decide whether any additional members will be accepted or not.

Any new participant in the Workshop at a later date is decided on by the participants making up the Workshop at that time. It is particularly important to consider these aspects:

a. expansion would be conducive to shortening the duration of the Workshop or to avoiding or averting an impending delay in the planned duration of the Workshop;
b. the expansion would not result in the Workshop taking longer to complete;
c. the new Workshop participant would not address any new or complementary issues beyond the scope defined and approved in the project plan;
d. the new Workshop participant would bring complementary expertise into the Workshop in order to incorporate the latest scientific findings and state-of-the-art knowledge;
e. the new Workshop participant would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;
f. the new Workshop participant would ensure wider application of the CWA.

All Workshop participants who approved the publication of the CWA or its draft will be named as authors in the European Foreword, including the organizations which they represent. All Workshop participants who did not approve the publication of the CWA will not be named in the European Foreword.

5.2 Workshop responsibilities

The Workshop Chair is responsible for content management and consensus building. The Workshop Chair is supported by the Workshop Vice-Chair (if any) and the responsible Workshop secretariat, whereby the Workshop secretariat will always remain neutral regarding the content of the CWA(s). Furthermore, the Workshop secretariat shall ensure that CEN-CENELEC's rules of procedure, rules of presentation, and the principles governing the publication of CWA(s) have been observed. Should a Workshop Chair no longer be able to carry out her/his duties, the Workshop secretariat shall initiate the election of a new Workshop Chair. The list below covers the main tasks of the Workshop Chair. It is not intended to be exhaustive.

- Content related contact point for the Workshop
- Presides at Workshop meetings
- Ensures that the development of the CWA respects the principles and content of the adopted project plan
- Manages the consensus building process, assesses when the Workshop participants have reached agreement on the final CWA, on the basis of the comments received
- Ensures due information exchange with the Workshop secretariat
- Represents the Workshop and its results to exterior

The Workshop secretariat, provided by a CEN and/or CENELEC Member, is responsible for organizing and leading the kick-off meeting, in consultation with the Workshop proposer. Further Workshop meetings and/or web conferences shall be organized by the Workshop secretariat in consultation with the Workshop Chair. The list below covers the main tasks of the Workshop secretariat. It is not intended to be exhaustive.

- Administrative and organizational contact point for the Workshop
- Ensures that the development of the CWA respects the principles and content of the adopted project plan and of the requirements of the CEN-CENELEC Guide 29
- Formally registers Workshop participants and maintains record of participating organizations and individuals
- Offers infrastructure and manages documents and their distribution through an electronic platform
- Prepares agenda and distributes information on meetings and meeting minutes as well as follow-up actions of the Workshop
- Initiates and manages CWA approval process upon decision by the Workshop Chair
- Interfaces with CEN-CENELEC Management Centre (CCMC) and Workshop Chair regarding strategic directions, problems arising, and external relationships
- Advises on CEN-CENELEC rules and brings any major problems encountered (if any) in the development of the CWA to the attention of CEN-CENELEC Management Centre (CCMC)
- Administrates the connection with relevant CEN or CENELEC/TCs

5.3 Decision making process

The CEN and/or CENELEC Workshop Chair is responsible for ensuring that the development of the CWA follows the principles and content of the project plan described in this document and the requirements of CEN-CENELEC

Guide 29. The CEN and/or CENELEC Workshop Chair may take decisions on the conduct of the CEN and/or CENELEC Workshop on the basis of the comments expressed by the participants and of CEN-CENELEC Guide 29.

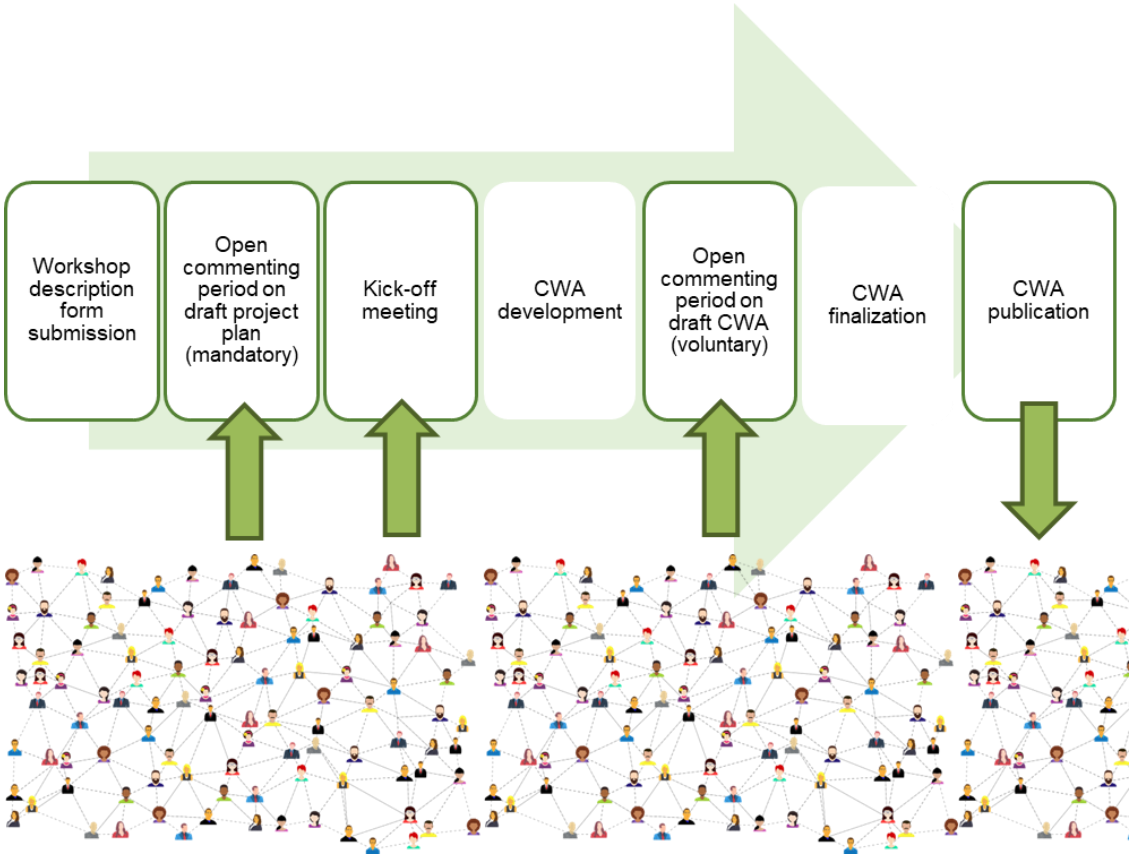
Decisions shall be taken based on consensus of the WS participants.

6 Dissemination and participation strategy

Potential participants identified in section 2.2 and potential interested stakeholders identified in Part A should be informed of the open commenting phase, if any, and of the publication of the CWA.

In addition to the CCMC website, the final CWA might be advertised on:

- sector specific newsletter
- social media, such as
  - LinkedIn
  - X
- Research Gate
- EC Newsroom
- Other



Annex I – Security risk analysis

This annex shall be completed if section 1.12 of Part A indicates that security aspects are addressed by the Workshop.

I.I General

Security risk analysis is a process of identifying and analysing the main negative factors that may affect a standardization project's objectives. The following is targeted at secretariats of CEN and/or CENELEC Workshop Agreements (CWA) dealing with security issues. Its purpose is to help them identify and mitigate the risks associated with their project. It is structured around two main security threats that can affect the success of the work: major diverging interests among stakeholders and sensitive information.

I.II Risk analysis on major diverging interest among stakeholders

Diverging interests among stakeholders can impede the process in reaching agreement on the CWA and even lead to failure to deliver the planned CWA. In order to identify and possibly mitigate the risks, the following questions should be reviewed:

– Is the planned CWA expected to have a major impact on the security policy/strategy of the core stakeholders?

– Does the scope of the CWA cover products or services with a clear dual-use purpose (i.e. which can be used for military purposes)?

I.III Risk analysis on sensitive information

– In light of the scope of the CWA, is it likely that it may deal with sensitive information? If so, what is the information sensitivity level?

– Is there a need for a (non-)disclosure agreement?

– Is there any conflict of interest for stakeholders involved in the CEN and/or CENELEC Workshop, regarding especially the use they may make of any information they receive during the development of the CWA?

– What steps should be taken to manage information dissemination and storage (e.g. memory stick, emailing, storage) during the development process of the CWA?