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EsSENce Cost Action CA19118

Project Title:

“High-performance Carbon-based composites with Smart properties for Advanced Sensing Applications”



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Deliverable Title	High-level roundtable discussion with representatives of past and existing relevant EU efforts complementary to this COST Action
Working Group	WG1: NETWORKING ACTIVITIES & COORDINATION
Originator	E.A.Pavlatou

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1 Summary

WG1 is strategically coordinating various network activities, aiming to promote interdisciplinary communication, synergies, knowledge exchange, and access to COST Action tools. Annual Meetings are organised, to gather all stakeholders and scientists of the different communities, by synchronising scientific sessions, WG meetings, courses, and end-user sessions. WG1 is also ensuring that knowledge exchange is promoted through the Action's events. Additionally, WG1 is also working with the Management Committee (MC), in order to select candidates for local organisation of events and manage the applications for educational events. Moreover, the aim of WG1 is to promote the enrichment of the initial Network with the engagement of new scientists and researchers either from the industrial or the academic field, by considering the gender balance and the empowerment of young researchers and innovators. Within this WG, S&T core groups will be established for each one of the following WGs.

1.1 The main aim and objective of the Action

The goal of EsSENce is to develop an innovation scientific hub at European and International level, focusing on advanced composite materials reinforced with Carbon based (nano)materials (CNMs).

The aim of EsSENce hub, defined as a collaborative community, is to gather together scientific partners, research groups, technology providers and industrial key players aiming to enhance creativity and collaboration among them, by positioning the entrepreneurial individuals at the centre. Indeed, by building a community with diversity both in the broad sense (gender, ethnicity) and with regards to heterogeneous knowledge, the emergence of novel ideas and practices is fostered thus leading to unique and viable innovations. EsSENce activities focus on the promotion of the successful results from the involved partners and the utilization of the synergistic effect to improve exploitation and dissemination of knowledge. Dissemination and management actions are organized such as to attract the interest of research and industry for higher awareness. The intention is to enable as many groups as possible to participate in a highly integrated innovation environment, which will develop Workgroups, will organize Workshops and Conferences, as well as Training Schools and Seminars. EsSENce promotes mobility among researchers, junior scientists and students working on these fields, while promoting contacts with related industries.

The hub is a unique opportunity for all the involved people to share ideas about innovative solutions and joint efforts to create new composite materials that are particularly applicable in specific uses, which were previously not possible due to the use of conventional monolithic materials, such as polymers/plastics, metals, glass, and ceramics.

2 Objectives and achievements

2.1 Summary of the high-level roundtable discussion

During the 2nd (Hybrid) Core Group Meeting entitled “Special Session COST EsSENce Action: High-performance Carbon-based composites with Smart properties for Advanced Sensing Applications”, which was held the 9th of December 2021, were presented and discussed thoroughly the rules, aims and objectives of the new Cost Action (Action Number: CA19118), as well as was discussed the internal progress and/or issues of the Action by the WGs Leaders. This meeting gave us the opportunity to host the high-level roundtable discussion with representatives of past, existing and on-going relevant EU efforts complementary, or not, to this COST Action (Table 1).

Name/Surname	Company	Institute	University	EU Projects (past and on-going)
Chiara Pernechele	Dallara Automobili			Smartfan , Eurecomp
Raquel Santos		Inegi		Smartfan , Modcomp , Spacecarbon , Eurecomp , Iclimabuilt
Robert Bohm			HTWK	Eurecomp
Paolo Bondavalli	THALES			Fibralspec , Modcomp , Smartfan , Nanomecommons
Agustin Chiminelli		ITAINNOVA		Smartfan , Safejoint , Impure , Eurecomp
Spyros Diplas		SINTEF		Byefouling , Lorcenis , Nanomecommons
Ludwig Cardon			UGENT	Repair3D
Thomas Parissis	Stratagem			Precycling , Iclimabuilt , Eurecomp

Table 1: Participants of the high-level roundtable discussion

Lastly, during the meeting was conducted an overall discussion regarding the Action, as well as the EU project related to the project's content.

2.2 Results and future steps

During this discussion, we agreed that we need to work in order to establish strong liaisons with international business networks through linking and sharing of information to identify current industrial market needs.

The processes of dissemination of the hub objectives, challenges and results both to specific sector audience (scientific and industrial) and to the large audience through e-platforms and social media, is ongoing. By taking advantage of different COST Action tools, we promoted interdisciplinary work streams using synergies between the participating groups for an efficient exchange of knowledge.

Efforts have been made for the promotion of EU groups contribution to the emergence of new value chains and the aim to take a leading position globally, supporting internationalization towards third countries beyond Europe.

Through EsSENce, projects have been started that improve global competitiveness and independence for the EU in the production and commercialization of carbon-based multi-functional products.

The activities of the team have resulted in the organization of two on-going projects:

- [Eurecomp](#)
- [Carbo4power](#)

EuReComp is an EU funded collaborative research project with a strong focus on circularity, set out to provide sustainable methods towards recycling and reuse of composite materials, coming from components used in various industries, such as aeronautics and wind energy. The cumulating composite wastes are more prominent than the needed new composites. The aircraft and wind energy sectors contribute to a major share of this. Across all industries about 60% of waste fiber reinforced composites is landfilled, causing severe societal and environmental issues. EU's Circular Economy plan seeks to reduce the landfill down to 10% by increasing the rate of recycling. As landfilling is highly discouraged in wind and transport sectors, relevant stakeholders seek to replace it with more advanced technologies and end-of-life options, which promote the recycling of carbon fibers.

The main pathways that EuReComp proposes to achieve circularity will include:

- repairing, repurposing and redesigning parts from end-of-life large scale products and
- recycling and reclamation of the materials used in such parts; thus, accomplishing reduction of waste and transformation to high-added value products.

The methodologies developed within the EuReComp project, will be further tested and validated by developing five (5) demonstrators using novel manufacturing methodologies and incorporating recycled materials, obtained from different recycling processes, leading to a range of new circular composites.

Carbo4Power will develop a new generation of lightweight, high strength, multifunctional, digitalized multi-materials for offshore wind and tidal turbine rotor blades that will increase their operational performance and durability while reducing the cost of energy production (below 10 ct€/ kWh for wind turbines and 15ct€/kWh for tidal), maintenance and their environmental impact. The innovative concept is based on nano-engineered hybrid (multi)materials and their intelligent architectures which breaks down as follows:

- Nanocomposites based on dynamic thermosets with inherent recyclability and repairability and tailored nano-reinforcements to enhance mechanical properties.
- Multifunctional nano-enabled coatings to improve turbine protection (e.g., against lightning and biofouling (e.g. 50% fouling release)).
- Blade segments will be designed and fabricated by advanced net-shape automated multi-material composite technologies that will allow ca. 20% scrap reduction.
- The approach for WTB is to deliver innovative design of modular rotor blade, while the approach for TTB is aimed towards an optimal design for 'one-shot' manufacture.
- Recycling of blade materials will be increased up to 95% due to the advanced functionalities of 3R resins and adhesives with debonding on demand properties.

The strategic goal is to provide the frame which will create new pathways for manufacturing of FRPs for multiple processing life cycles, and explore the emerging valorisation opportunities in offshore energy sector.

We continue our networking and communication with other relevant networks to promote multidisciplinary and cooperation in the production of CNMs and nanocomposites through dedicated web forum.

We are working towards connecting at national and international level with projects (including H2020 and Horizon Europe) dealing with this topic and to consolidate the Consortium of research groups with complementary skills and know-how in order to increase the success rate in future EC funded proposals.