



CARBON FIBRES & ADVANCED HIGH PERFORMANCE COMPOSITES CLUSTER (CFPC)

EXCELLENCE AT THE SERVICE OF EUROPEAN COMPETITIVENESS FOR HIGH PERFORMANCE COMPOSITES

WWW.TECHNOLOGYCLUSTER.EU

The Cluster activity under H2020 aims to bring together EC funded projects to enable the sharing of ideas, results and concepts, contributing to the EU Strategic Research Roadmaps and to use the synergistic effect to improve the dissemination and exploitation of the project results and enhance their impact.

Five projects, which initially formed this cluster, relate to the sustainable production and recycling of carbon fibres (CF) and carbon fibre composites.

CARBOPREC, **FIBRALSPEC** and **NEWSPEC** investigate CF precursor development where cheaper CF and independence from international monopolies are some of the main aims. **EUCARBON** aims at independence from non-European suppliers on Space qualified carbon fibres.

REFORM deals with the recycling of CF composites. Six more projects have been added: **FIBREMOD** (Fibre break models for designing novel composite microstructures and applications), **BIO4SELF** (Biobased self-functionalised self-reinforced composite materials based on high performance nanofibrillar PLA fibres), **1D-NEON** (1D Nanofibre Electro-Optic Networks), **MODCOMP** (Modified cost effective fibre based structures with improved multi-functionality and performance), **GREENLIGHT** (Cost effective lignin-based fibres for innovative light-weight applications).

NEW CLUSTER PROJECTS

FiBre_MoD
Marie Skłodowska-Curie European Training Network

BIO4SELF

1D NEON

MODCOMP

GreenLight

RESULTS FROM THE ONGOING CLUSTER PROJECTS

carboprec



- Protocol for acrylation of lignin in pilot-scale and First time proof of technical feasibility of organosolv fractionation of softwood methods
- Elaboration of masterbatches for CNT dispersion in lignin matrix
- Homogeneous and stable liquid dispersion for addition in cellulose dope and Knowledge in noncovalent interactions between bio-based matrices and carbon nanotubes
- Implementation of multifilaments wet-spinning line for carbon nanotubes doped cellulose fibers
- Formulation of lignin including plasticizer and carbon nanotubes
- Carbonization of cellulose based precursor fibers/textiles and of hybrid lignin/cellulose based precursor fibers/textiles
- Weaving of both precursors fibers and carbon fibers and Composite processing by RTM, infusion, SMC using thermoset and thermoplastic resins and methodology for testing composites.

NEWSPEC



- Green polyethylene precursors for carbon fibres (CF) based on bio-PE blends.
- Modification of PE precursor using carbon nanotubes (CNT) or crystalline nano cellulose (CNC)
- Batch samples of PE-CFs have been processed at lab scale.
- Continuous stabilization pilot line for sulfuration treatment of PE fibre precursor has been designed, manufactured and installed
- Double-spot pilot prototype for plasma treatment and surface functionalization of endless CF
- Transportable remote Raman system for on line monitoring

- Implementation of a manufacturing site with the capacity to produce high modulus carbon fibres (with the installation of a high temperature furnace at FISIFE's carbon fibre manufacturing pilot plant)
- High modulus carbon fibre grade (12k-filaments tow with a tensile modulus of 348 GPa and tensile strength of 4200 MPa)
- Epoxy pre-impregnated materials based on these fibres and on reference high and ultra-high modulus carbon fibres
- Manufacturing of two Space demonstrators with the European high modulus carbon fibres (a tube (for strut) and an antenna sub-reflector).

EUCARBON



- Supercapacitors based on Carbon Nano Fibers (CNFs) for next generation energy storage devices
- A prototype of Operational Mechano-Electro Spinner
- A continuous stabilization line (for oxidation treatment of Cfs precursors).
- Green precursors of carbon fibres based on lignin and blends
- Production of carbon fibers with enhanced properties developed within the framework of the project operations of nanoprofiling and nanomodification using nanoparticles produced from plant raw materials.
- Protocols for analyzing fiber/matrix interface mechanical behavior with a fast, local, non destructive method
- Novel composites based on CFs with enhanced properties (new nanoprofiled fibers and fibers with new nanomodified glazing) together with nanomodified binders.

FS



- Methods to improve the recyclability and reuse of composite components
- RE-FORM boards, which use recycled material to replace virgin material with a reduction in raw material use and costs of 30% - 40%, as well as reducing storage weight and volume for fixtures
- Laser-assisted tape-layup system that lowers setting energy and scrap by 50% and cost by 45% for the right part

REFORM

- A low-cost open-source augmented reality lay-up system
- Water and abrasive recycling unit that recovers up to 95% of abrasive and water during use, as well as waterjet hardware, software and parameter sets that reduce cutting time and energy use of waterjet machining 50% - 75%
- Fibre recovery mechanism that can reclaim fibres with under 5% resin content and with strength losses of only 25% - 30% and 40% - 50% for carbon and glass, respectively.

CONTACTS

EC CONTACT

Achilleas Stalios
Cluster Coordinator

European Commission
DG Research & Innovation
Advanced Materials and Nanotechnologies
achilleas.stalios@ec.europa.eu

TECHNICAL SECRETARY

John Yellup
JMY Associates
john.yellup@gmail.com

DISSEMINATION MANAGER

Isella Vicini
Warrant Group S.r.l.
isella.vicini@warrantgroup.it

CLUSTER GOVERNANCE

Prof. Costas Charitidis

Head of RNanoLab, Materials Science and Engineering Department at School of Chemical Engineering, National Technical University of Athens (Greece)

charitidis@chemeng.ntua.gr

Prof. Ignace Verpoest

KU Leuven, Faculty of Engineering Science, Structural Composites and Alloys, Integrity and Nondestructive Testing Unit (Belgium)

ignaa.verpoest@mtm.kuleuven.be

Dr. Nuno Correia

Director of the Composite Materials and Structures Group, INEGI – Instituto De Ciência e Inovação Em Engenharia Mecânica e Engenharia Industrial (Portugal)

ncorreia@inegi.up.pt

Dr. Matteo Falasconi

Senior Consultant - Warrant Group S.r.l. (Italy)

matteo.falasconi@warrantgroup.it

