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Northumbria University NEWCASTLE
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Graphene Alliance for Sustainable Multifunctional Materials to Tackle Environmental Challenges

GRAPHENE FLAGSHIP
UK Research and Innovation
Funded by the European Union

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GIANCE
Fused with Sustainability

PROJECT

GIANCE presents creative solutions to environmental challenges by establishing a comprehensive and industry-driven platform. This platform aims to design, develop, and produce the next generation of affordable, eco-friendly, lightweight, and recyclable materials based on graphene and related substances (GRM). These materials include multifunctional composites, coatings, foams, and membranes (GRM-bM) with enhanced properties, such as thermal, mechanical, and chemical features.

These innovations also improve functionalities like wear resistance, corrosion resistance, chemical and fire resistance, hardness, impact resistance, high-temperature resistance, and structural health monitoring. Additionally, GIANCE focuses on enabling hydrogen storage. The project strives to advance manufacturing processes, enhance synthesis and stability, and minimize environmental impact.

The GRM-bM and manufacturing capabilities developed by GIANCE will foster strong connections with end-users, enabling the qualification and development of commercial propositions to high Technology Readiness Levels (TRLs). GIANCE aims to demonstrate and validate the effectiveness of GRM-enabled products through 11 use cases, influencing future technologies across various sectors, including automotive, aerospace, energy (hydrogen economy), and water treatment.

OBJECTIVE

1. Develop and Validate Highly Innovative and Sustainable Materials for New Scalable Use Cases (UCs)
2. Develop and Optimize Sustainable Manufacturing Technologies
3. Implement Life-Cycle Assessment (LCA), Life-Cycle Cost (LCC), and End-of-Life (EOL) Strategies
4. Accelerate Innovation and Contribute to the Governance and Coordination of the Graphene Flagship (GF) Initiative

IMPACTS

GIANCE's Revolutionary Materials Solutions project pioneers novel, scalable GRM-bM materials, boosting eco-designed manufacturing processes. This positions the EU as a global GRM-bM leader, fostering innovation and competitiveness. Embracing a circular economy, the project enhances recyclability, achieves significant weight reduction in automotive applications, and improves multifunctional performance. Innovations in manufacturing, strategic autonomy, and competitiveness are bolstered, while a sustainable supply chain is prioritized. With up to 30% improved environmental performance, the project aligns with the EU Circular Economy Action Plan, fortifying European resilience and leadership in the green and digital revolution.

- Develops revolutionary Materials Solutions
- Elevates EU Leadership and drives Circular Economy
- Significant Weight Reduction and Energy Efficiency in transport sector
- Optimizes manufacturing processes for resource efficiency
- Achieves up to 30% improvement in environmental performance.
- Accelerates adoption of innovative materials