NEWSPEC: New Cost-Effective and Sustainable Polyethylene Based Carbon Fibres for Volume Market Applications

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NEWSPEC is a funded EU-FP7 project that aims at the production of new Carbon Fibres (CFs) through very promising low-cost sustainable polyethylene (PE) precursors. NEWSPEC is coordinated by Brembo SpA and brings together the best available expertise in Europe for the development of the PE-CFs up to mature exploitable technology.

PE presents interesting technical features: high carbon yield (~70%), high processability and flexibility and very competitive cost (~2 euro/kg) with respect to PAN precursor - which may result to cost savings of up to 70%. Final PE-CF production cost equals to 10 euro/kg against about 15 euro/kg of PAN fibres, thus reaching 30% cost saving on similar production scales. The goal is the processing of continuous PE-CFs at the HPFC (High Performance Fibre Centre) pilot plant facility based in Denkendorf (Germany), with specific target properties: tensile modulus 200-250 GPa, tensile strength 2 GPa, elongation >1%, fibre diameter <10 microns, optimal resin wetting and adhesion, tailored conductivity.

NEWSPEC brings about several innovation elements. An original non-wet stabilization method that introduces heteroatoms at the precursor stage is proposed, with remarkable technical, economic and ecologic advantages. Novel strategies for the reduction of the graphitisation temperature via the use of nucleation agents (i.e. cellulose nanowhiskers, CNTs and fine graphite powders) are being addressed. The partners are also exploring the possibility of surface modification via atmospheric plasma techniques and room-temperature grafting with specific surface-attacking chemicals. Online non-destructive laser Raman probe, that can provide in situ information for the development of the various fibre structures during the processing stages, will be developed. Specific carbon composite prototypes will be manufactured and tested by the end-users to ensure the validation of CF functionality for the final components with this ensuring proper exploitation of results. To prove overall environmental and economic sustainability LCA and LCC are implemented throughout.

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