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Publisher's version / Version de l'éditeur:

SPE-ACCE 2024 Conference and Exhibition, 2024-09-06

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USE OF RECYCLED GLASS FIBRES FROM END-OF-LIFE WIND TURBINE BLADES IN THERMOPLASTIC COMPOSITES FOR AUTOMOTIVE, CONSTRUCTION AND 3D PRINTING APPLICATIONS

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Abstract

The waste created due to the rapid expansion of the wind energy industry is escalating at an exponential rate and is projected to result in 43 million tons of discarded wind blades by 2050. The first generations of wind turbines are now reaching their end-of-life, signaling the beginning of a significant future waste problem. The blades are currently sent to landfills, which is an environmentally damaging solution. Efforts to manage this waste can bring environmental-friendly solutions such as a significant reduction in CO₂ emissions and the reuse of glass fibres recycled from blades. Significant quantities of recycled glass fibres can be extracted through various mechanical processes and can be compounded with a large number of thermoplastics to create new composites to be used in different industries.

The aim of this work was to use glass fibres recycled from wind turbine blades in four different thermoplastics, i.e., polypropylene, polyamide, acrylonitrile butadiene styrene, and recycled polystyrene to produce composites through a compounding melt-process. The obtained eco-responsible composites were fully characterized and demonstrated mechanical, thermal, and micro-structural characteristics equivalent to commercial glass fibres composites. The results from this work indicate that recycled glass fibres from wind turbine blades can be highly valuable in the manufacturing of parts for automotive, construction, and 3D printing industries.