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Fiber Reinforced Resin Pre-impregnated Composite Material with Water Dissolvable Backing Film

Fiber-reinforced composite with water-soluble backing film enables recycling of prepreg waste without defects.

Researchers at Purdue University have developed a fiber reinforced composite prepreg with a water-soluble backing film. The use of composite prepreg has increased significantly in recent years as various industries are leveraging the material for its mechanical and physical properties. However, composite prepreg is manufactured with backing film to prevent this tacky material from sticking together when rolled. To recycle/reuse leftover and end-of-life prepreg, it is important to ensure that no backing film remains, as its presence in the recycled composite part can cause defects such as delamination. Removing the backing film from the leftover uncured prepreg manually is labor-intensive work, and it is difficult to make sure there is no backing film left in the reusing prepreg material.

This novel water-soluble backing film developed by Purdue University researchers provides composite material manufacturers with an improved way to recycle/reuse prepreg waste and other types of reinforced composite materials. This method also allows reuse of the backing film itself. With no existing solutions to successfully recycle composite leftover after ply cutting, the water-soluble backing film will be invaluable for promoting the environmental and economical sustainability of composite materials.

Technology Validation:

To investigate how the backing film removal process affects mechanical properties of the reused prepreg, tensile and double cantilever beam (DCB) tests were performed and showed that the PVA backing removal process and drying process did not negatively affect the tensile property and interlaminar strength of the reused composite laminate substantially.

Advantages:

Technology ID
2022-KIM-69678

Category
Aerospace & Defense/Hypersonics & Propulsion Systems
GreenTech/Circular Economy & Waste Reduction
Automotive & Mobility Tech/Micromobility & Smart Urban Infrastructure

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-Environmentally friendly

-Inexpensive

-Easy to use; less need for manual labor

-Allows recycling of both prepreg and backing film

Applications:

-Composite material manufacturing for Aerospace, Automotive, Maritime, and Sporting goods industries

Publication:

https://www.sciencedirect.com/science/article/abs/pii/S2214993724001969?via%3Dihub

TRL: 4

Intellectual Property:

Provisional-Patent, 2024-04-22, United States

Utility Patent, 2025-04-18, United States

Keywords: composite recycling, fiber-reinforced resin pre-impregnated composite material, Green Technology, Materials and Manufacturing, prepreg, water-soluble film