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Cryogenic Testing of Advanced Fibre Composite

Lightweight storage vessels are important for the transportation and storage of hydrogen in vehicles such as spacecraft, satellites, cars and marine ships. Existing carbon-fibre reinforced composites suffer matrix cracking that leads to leakage and lower strength. Techniques to eliminate matrix cracking by nano-scale engineering of polymer matrixes are being developed.

Competitive advantage

- Lightweight and strong fibre composites that can safely operate at cryogenic temperatures without microcracking are urgently needed to reduce the weight of future aerospace craft, launch vehicles, fuel storage, and other space missions. This need is being addressed with extensive expertise in:
- Nano-engineering of fibre reinforced composites to simultaneously improving mechanical, electrical and other functionalities such as gas permeability
- Design and manufacturing of carbon fibre composites for extreme operating conditions, such as high mechanical stress and super cold temperatures
- Automated manufacturing processes, such as fibre placement and filament winding to reduce the cost of production

Impact

- Significant improvement of mechanical properties and permeation leakage in cryogenic tanks
- Lighter fibre-composite tanks for transporting and storing liquid hydrogen as a fuel source

Successful applications

- Prototype development of carbon fibre composite tank for storing liquid hydrogen, Lockheed Martin

Our partners

- Lockheed Martin

More Information

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