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Title of the Thesis-

“Characterization of Polymer Composites for Cryogenic and Allied Applications”

ABSTRACT

Advances in the development of materials play a crucial role in the progress of cryogenic technologies. Polymer composites are excellent engineering materials and can be a substitute either fully or partially combined with metallic parts for the development of various types of equipment/components to be operated at cryogenic temperatures (below -150°C).

The potential for these polymer composite materials in the low-temperature range still remains unexplored, particularly for the lack of adequate data on characterization.

Therefore, the characterization of polymer composites from the consideration of their utilization in the fabrication of cryogenic storage containers, plant components, cryostat, and other equipment being used at cryogenic temperature becomes the need of the hour.

In this regard, a rigorous study from the theoretical and experimental points of view on the basis of the determination of some of the mechanical and physical properties of the glass fiber-reinforced plastic composites for cryogenic applications has been conducted which finally establishes the feasibility of the indigenous development of Glass Fibre fiber-reinforced plastic tube and its subsequent use as a neck of an indigenously built stainless steel cryogenic Dewar vessel of 3 litre capacity for storing cryogenic fuel, liquid nitrogen, liquid oxygen etc as well as a performance study of aluminized mylar as a Multi-Layer Insulation system of a cryogenic vessel. The work stresses material characterization, design, analysis, fabrication, and successful experimental run of the prototype cryogenic Dewar developed.



Signature of the Supervisor

27.12.2023



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