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Studies on thermal conductivity of epoxy-aluminium composites in the range of 300 K to 4.5 K for the development of cryosorption pumps

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Content :

Cryosorption pumps are the only solution in nuclear fusion environment where helium and hydrogen are the by-products of reaction between deuterium and tritium. Cryosorption pumps are used to achieve ultra high vacuum in such harsh conditions. An important aspect in their development is the proper adhesion of the activated carbon granules onto the metallic cryopanel and their cooling to the lowest possible temperature by using high thermal conductivity adhesives to adhere the activated carbons. Hence, the thermal conductivity data of the select adhesives and activated carbons down to 4.5 K are quite essential, but they are not available in open literature. Maintaining the activated carbon granules at lower temperatures is an important factor for achieving high pumping speed of the cryosorption pump. This paper deals with the studies on thermal conductivity of epoxy-aluminium composites to enhance the pumping speed of cryosorption pump. Towards this, GM cryocooler based experimental setup has been developed to measure the thermal conductivities of epoxy-aluminium composite samples from 300 K to 4.5 K. The thermal conductivity data for pure epoxy and epoxy mixed with different percentage of aluminium powder will be presented in this paper. The above studies will enable to make the right choice of adhesives for the development of cryosorption pumps.

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