



# CNT-based Membrane as an Emerging Material in De-icing Technology

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## ABSTRACT

A strong demand for de-icing technology is needed because of the current transition from metal to composite aircraft frames. This material should be lightweight, reliable, have low cost and power consumption, and need little maintenance.

In this study, a self-heating composite CNT-glass fiber-epoxy (CNT-GFE) for de-icing was proposed for the first time. The CNT-GFE composite was fabricated by a series of steps using CNT-based membranes as a heater and glass fibers as the reinforcing layer. Electric heating performance of CNT-GFE was investigated at different heat flux densities. A non-uniform temperature distributed was observed on the surface of CNT-GFE detected by an infrared temperature camera. The electric heating performance was recorded by monitoring the power input (by changing either the voltage or current). The placement of the CNT- based membranes in the composite and its position with respect to the power source allows the creation of a temperature gradient, which can be very beneficial in de-icing structures. The electric heating performance of the composite was tested at different heat flux densities. The feasibility of the de-icing performance was demonstrated through a series of experiments and the results indicate that CNT-based membranes (In the form of foils, layers, etc.) could be a promising candidate as an electrical heating material for de-icing.

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