

Comparative Evaluation of a Carbon Fiber Heat Sink and Graphitic Foam in Boiling Heat Transfer

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The carbon-fiber heat sink consists of a very large number of small cross-section fins fabricated from carbon pitch fibers. For these carbon pitch fibers, the high thermal conductivity reduces the temperature drop along the length of the fin, allowing a longer fin length than for copper fins. The longer length results in more heat transfer surface area and a more effective heat sink. It is proposed that the use of this heat sink in boiling heat transfer will result in high heat removal rates. The rough surface of the fin will provide multiple nucleation sites. This project proposes to experimentally determine the heat removal rate from the carbon-fiber brush heat sink and evaluate the critical heat flux. The bubble motion will be investigated using digital videography to determine any influence of the close fin pitch on bubble formation and motion. The results will be compared to the performance of graphite foams.