

Fabrication of heat sink based on carbon nanotubes

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Efficient cooling is a crucial issue for miniaturized electronics and demands materials with high thermal conductivity. Carbon nanotubes (CNTs) have been reported to possess outstanding thermal conductivity up to $3,000 \text{ Wm}^{-1}\text{K}^{-1}$ and have thus attracted intensive interest in the field of heat management. In this study, we fabricated CNT based heat sink by growing CNTs on copper substrate and investigated the performance of CNT based heat sink. CNTs were grown on copper substrate by thermal chemical vapor deposition. To compare the heat dissipation effect, control experiments were also carried out by using bare Al and Cu substrates. The fabricated CNT based heat sink, Al, and Cu heat sinks were attached to thermal heat source. Temperature of opposite side gradually increased and approached an equilibrium value after 1 hr. Performance of CNT based, Al, and Cu heat sink was evaluated by comparing their equilibrium temperature. CNT based heat sink showed 14, 25 °C lower equilibrium temperature than those of Cu and Al heat sinks, respectively. Our CNT based heat sink exhibited superior properties as heat sink to the Al and Cu heat sinks. It is expected that control of CNT length and introduction of CNT patterns would result in better performance of the heat sink.