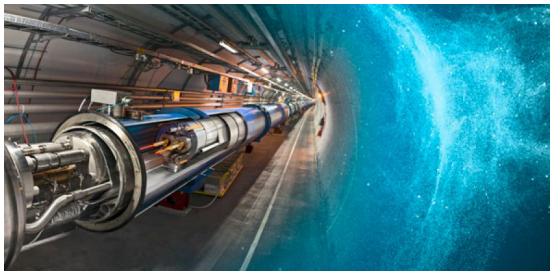

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Thermal Performance of Developed Carbon Nanotubes and Nanospheres Based Thermal Interface Materials for Heat Dissipation Applications.

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In this study, the incorporation of 0D and 1D carbon nanomaterials in a commercial thermal interface material is reported to enhance the heat transfer of electronic devices. The investigated thermal interface materials were fabricated following a protocol based on sonication of the carbon nanomaterials and the thermal compound in acetone at 55 ℃. In order to test the applicability of the fabricated thermal interface materials, a setup was designed to simulate the operating conditions of standard electronic components. The experimental setup monitored the heat dissipation and transmission to the heat sink and allowed the acquisition of the data by means of LabVIEW software. The role of the carbon nanomaterials incorporated was studied by varying the mass in the thermal interface materials in a range between 0 and 10 %. The large heat transfer is reported with thermal interface materials containing 1% of carbon nanomaterials, corresponding to a temperature drop of 2 ℃. In addition, the thermal resistance Rth of the thermal interface materials was characterised by the ASTM D5470 approach. The reproducibility and reliability of the reported results were shown as part of the study. These measurements are found to be in accordance with the testing stand results. The new thermal interface material was tested in the low voltage power electronics and a temperature drop of over 5 ℃ was observed. The use of these new thermal interface material as part of the current upgrade of the ATLAS detector at CERN will have good impact, such as protecting the electronics from overheating and will expand their life span.

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