SUPERCRITICAL FLUID- A PROSPECTIVE SUPER COOLANT

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In the recent years, computing power of mobiles phones and computers have increased significantly. That is a boon for users but it comes with the cost of higher power density or in nonprofessional terms more heating of electronic devices.

In order to decimate deterioration of the operating performance and reliability of components due to overheating, reliable thermal management is essential. Therefore, high heat flux thermal management techniques are crucial for not only mobile phones but also other components of various engineering systems such as micro-electrical engineering, computer data centers, avionics system, electric vehicles and solar thermal power production.

Over the decades, in consequence, great efforts have been dedicated to the development and augmentation of efficient cooling techniques as well as exploring alternate working fluid. Miniaturized heat sink owing to its higher surface area per unit volume, which renders higher heat transfer coefficient, has attracted researchers in the recent decades.

In recent years, supercritical carbon dioxide has been explored as a working fluid in power cycles and heat pump systems. The thermo physical properties variation of supercritical carbon dioxide near the pseudo critical point make it a potentially appealing fluid for the thermal management of high heat fluxes in micro channel geometries.

Supercritical carbon dioxide, having high volumetric heat capacity and thermal conductivity, especially in the pseudo critical region enables high heat flux thermal-management, and pumping power as compared to liquid and two-phase cooling systems has attracted researchers as sustainable coolant.

In addition, Supercritical carbon dioxide has been explored due to less detrimental effect on environment as compared to conventional refrigerants and easily realizable critical pressure and temperature. Therefore, as the name suggest it really has some tremendous potential to be a future coolant.

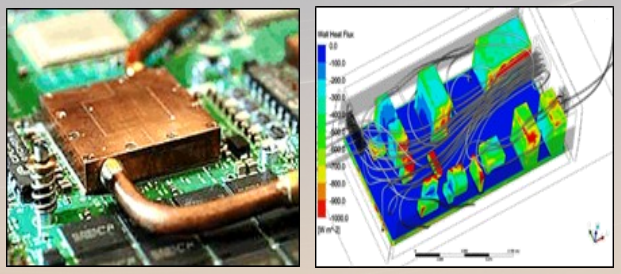

Fig: Thermal management system