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(54) Title of the invention : AN IMPROVED MICRO-CHANNEL HEAT SINK DEVICE WITH CURVED SECTION FOR EFFICIENT COOLING OF ELECTRONIC DEVICES

(51) International classification :H05K0007200000, H01L0023473000, F28D0015020000, H01L0023467000, F25B0039000000 (86) International Application No :PCT// Filing Date :01/01/1900 (87) International Publication No : NA (61) Patent of Addition to Application Number :NA Filing Date :NA (62) Divisional to Application Number :NA Filing Date :NA	(71)Name of Applicant : 1)INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD Address of Applicant :Dhanbad - 826004, Jharkhand, India Dhanbad ----- Name of Applicant : NA Address of Applicant : NA (72)Name of Inventor : 1)MEET NAIK Address of Applicant :Department of Mechanical Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad, Dhanbad – 826004, Jharkhand, India Dhanbad ----- ----- 2)PAWAN KUMAR SINGH Address of Applicant :Department of Mechanical Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad, Dhanbad – 826004, Jharkhand, India Dhanbad ----- ----- 3)SAUMYA SINGH Address of Applicant :Department of Mechanical Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad, Dhanbad – 826004, Jharkhand, India Dhanbad ----- ----- 4)VIVEK BAJPAI Address of Applicant :Department of Mechanical Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad, Dhanbad – 826004, Jharkhand, India Dhanbad ----- -----
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(57) Abstract :

The invention relates to an improved micro-channel heat sink device with curved section for efficient cooling of electronic devices. The design of the existing flat micro-channel heat sink is modified to the novel curved micro-channel heat sink to enhance the heat transfer without significantly increasing pumping pressure. The proposed design comprises two sections. The first section is the curved section, followed by a downstream section of the slotted flat surface. The thermofluidic properties (Nusselt number and Friction factor) of the proposed curved micro-channel heat sink are studied numerically and experimentally using DI water as a working liquid. The comparison of the aforementioned with a straight micro-channel heat sink is also accompanied. The conclusion extracted from the observed thermofluidic properties reveals that the heat transfer coefficient enhances due to (a) macroscopic mixing in the curved section pertaining to 2-D effects and (b) disruption of the boundary layer due to slots in the downstream section. Therefore, the thermal performance of a curved micro-channel heat sink is better than a straight micro-channel heat sink.

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