

عنوان مقاله:

Numerical investigation of the simultaneous utilization of multiple phase change materials in the performance of thermal management system combined with heat sink

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خلاصه مقاله:

Thermal management systems using phase change materials (PCMs) can improve heat absorption and increase safe operating times. However, limited research has explored combining multiple PCMs within a system. This study investigates the thermal performance of a two-dimensional heat sink with varied PCM configurations. Simulations tested RT-54, CaCl₂.6H₂O, and n-Eicosane arranged in different ways at 5 W and 7.5 W. Key results show CaCl₂.6H₂O with n-Eicosane increased the time to reach 40 °C by 186% compared to CaCl₂.6H₂O alone at 5 W. Pairing CaCl₂.6H₂O and RT-54 improved time to 40 °C by 425%. Increased power amplified these effects. The density and latent heat fusion of PCMs were critical factors. This demonstrates combining certain PCMs extends safe operating times more than using a single material. These optimal configurations can guide thermal management system design for electronics and other applications.

کلمات کلیدی:

Thermal management, heat sink, Phase Change Material, numerical simulation

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