



# THERMAL ENGINEERING, RESEARCH & MODELING IN INTELLIGENT COOLING SYSTEM (THERMiCs)



**THERMiCs**  
Thermal Engineering, Research & Modeling in Intelligent Cooling Systems

| Heat Exchanger | | Phase Change Materials |  
| Thermal Interface Materials |  
| Intelligent Cooling Techniques |

## ABOUT THERMiCs

THERMiCs is a multidisciplinary research group advancing thermal engineering through heat transfer science, intelligent control, and advanced simulation. The group tackles thermal challenges in high-density electronics, energy storage, and compact devices where conventional cooling falls short. Using tools like CFD, FSI, and AI-driven optimization, THERMiCs develops sustainable, high-performance thermal solutions that enhance reliability and efficiency in next-generation technologies. Its work supports both industrial innovation and long-term energy sustainability.

## OBJECTIVES

- Develop Advanced Thermal Management Solutions
- Innovate in Thermal Interface (TIM) and Phase Change Materials (PCM)
- Advance CFD-Based Thermal and Multiphysics Modeling
- Integrate Intelligent Cooling systems
- Support Reliability, Sustainability, and Energy Efficiency

## EXPERTISE

THERMiCs expertise in the field of thermal engineering that covers:

- Design and optimize heat exchangers
- Development of PCM-based thermal storage systems for transient load handling
- Multiphysics simulation: CFD, FSI and thermal-structural coupling
- Machine learning-assisted thermal diagnostic and control algorithms
- Thermal reliability assessment and accelerated life testing for electronics

## RESEARCH CONTRIBUTIONS & IMPACT

THERMiCs has developed compact finned heat exchangers for EVs and high-density electronics, engineered advanced TIM-PCM materials for improved heat transfer, and built simulation platforms for coupled thermal-fluid-structural analysis. Intelligent thermal control systems were also deployed, supporting real-time management and influencing industrial standards in automotive and power module design.

## PRODUCT INNOVATION & COMMERCIALIZATION

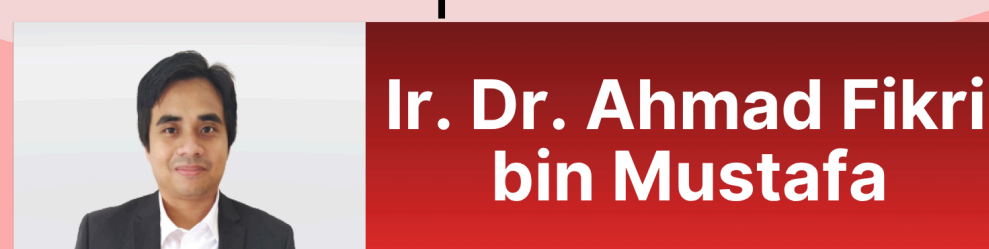
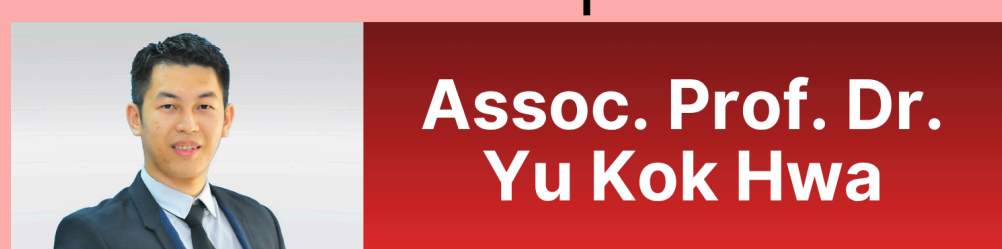
- Commercial-ready AI-integrated cooling modules for high-performance data centers and embedded systems
- Multifunctional PCM-TIM devices designed to handle peak heat bursts in space-constrained environments
- Customizable thermal simulation software tools for industry validation and thermal optimization
- Engineering design services for LED arrays, EV battery packs, and server cooling infrastructure

## RECENT USM-MOTOROLA SOLUTIONS COLLABORATION



## RESEARCH TEAM

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## FUTURE RESEARCH DIRECTION

THERMiCs aims to lead thermal innovation through AI-assisted fault detection, printable heat spreaders, and hybrid cooling for next-gen electronics. The group will expand predictive digital twin models and strengthen industrial co-development in renewable and aerospace sectors, supporting national progress in sustainable thermal technologies.