

THERMAL CONDUCTIVITY ALLOY

Advanced Alloy technology
for extreme environments



Tshwane University
of Technology

We empower people

TECHNOLOGY SUMMARY

The technology is a composite/alloy material comprising copper, niobium and graphene. The composite can be produced through temperature treatment/sintering of the constituent materials in solid form. Copper and niobium can be present at atomic ratios of 90:10 or 82:18, with graphene incorporated to enhance the material's performance. The resulting material is designed to retain strong electrical and mechanical properties under high-temperature operating conditions

UNIQUE BENEFITS

- Combines high electrical conductivity with high-temperature mechanical strength.
- Uses copper, niobium and graphene rather than toxic Cu-Cd or Cu-Be alloy systems.
- Potentially safer from a human-health perspective than cadmium- or beryllium-containing alternatives.
- Stronger and less soft than pure copper.
- Potential for improved durability in demanding high-temperature environments.
- Potential to reduce the attractiveness of electrical cables for theft due to increased material hardness/strength

STAGE OF DEVELOPMENT

Prototype/research-stage technology

IP STATUS

TUT intellectual property/invention

APPLICATIONS

- High-tension power transmission
- Aircraft engines
- High-field pulsed magnets
- Rocket components
- High-temperature valves
- Turbine engine components
- High-temperature electrical wiring

OPPORTUNITY

There is potential for licensing, co-development and industrial scale-up with companies operating in electrical transmission, aerospace, defence, advanced materials, power systems, automotive/e-mobility and high-temperature engineering. Commercialisation could focus on replacing conventional copper or environmentally problematic Cu-Cd/Cu-Be alloys in specialised high-performance applications.

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