Software Tool for Calculating Temperature Field of Metal-Dielectric Heterojunctions

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- Computer Technology

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- Computer Technology
- Data Storage
- Electrical Engineering
- Electronics
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- Transistors

Current temperature distributions of electrons and phonons in metal-dielectric heterojunctions are modeled using the two-temperature Fourier equation. Although an acceptable and accurate way to measure diffusive transport where the properties of materials and interfaces are known, this approach is less useful when properties are unknown.

Researchers at Purdue University have developed a software tool that uses a framework that can simulate the temperature distribution of electrons and phonons in a metal-dielectric heterojunction and predict electron and phonon nonequilibrium and their sizes. In comparison to existing solutions, this tool does not require the properties of material and interfaces to be known beforehand. Furthermore, the software can capture the ballistic transport behaviors of electrons and phonons and cannot only resolve nonequilibrium between them, but resolve the nonequilibrium among different phonon branches.

Advantages:
-Accurately predicts electron and phonon nonequilibrium and their sizes in metal-dielectric heterojunctions
-Capture and resolve nonequilibrium between electrons and phonons

Potential Applications:
-Thermal design of metal-dielectric heterojunctions in electronic devices
-Transistors
-Data storage
-Photovoltaic devices

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