

Case ID:M17-082P

Published: 2/13/2018

## Inventors

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# Anti-Frosting Bi-Layer Antifreeze Infused Coatings Based on the Nanoengineered Humidity Sink Effect

Aeronautics has grown exponentially within the past century and innovations within the have propelled an assortment of industries forward. Unfortunately, even though flight is the safest form of travel, there are still present dangers. Snow, ice, and frost formation on aircraft exteriors are known to have caused numerous aviation accidents. This problem is typically combatted with large amounts of anti-freeze substances.

Anti-freeze coatings inhibit condensation and prevent frosting. However, current technologies require large amounts of the coatings for sufficient results and degrades into toxic byproducts. This usage poses as an environmental issue. Therefore, there is a need for a water repellent and anti-freeze coating to reduce operational costs and environmental side effects.

Researchers at Arizona State University have created a thermal interface material with improved thermal conductivity from solid additives and liquid metal inclusions, or microdrops. The composite modification is generated by fuse connecting and reducing the interfacial resistance of the other high thermal conductivity solid additive particles. Electrical conductivity of the composite could be tuned through selecting electrically conductive or insulating solid particles. Because the appropriated liquid metals are gallium based, they naturally form an insulating oxide shell after fabrication. Therefore, not affecting the electrical conductivity. Nanoporous exterior inhibits condensation and frosting on the exterior for remarkably long times with minimal amount of layering.

### Potential Applications

- Aircrafts
- Ground vehicles
- Frost-sensitive technology

### Benefits and Advantages

- Reduced Operation and Environmental Impact – Minimized anti-freeze use up to 8-fold.
- Improved Performance – Prevents condensation and frost formation for 30-fold delay over solid surfaces.
- Enhanced Design – Bi-layer coating provides highly beneficial condensation and frost onset delay.

For more information about the inventor(s) and their research, please see

[Dr. Konrad Rykaczewski's Directory Page](#)

