

# Eastprint Inc. Printed, Transparent Heaters

Optical cameras are becoming the technology of choice for collision avoidance, intrusion detection, security, inspection, and process control systems. Cameras can be used to detect precise objects and AI processing can create 3D environment maps in real time enabling drones to fly without collision and autonomous cars to discern a pedestrian from a bicyclist or even a pot hole from a guard rail. All of these systems, along with RADAR and LiDAR sensors, will need to remain active even in harsh weather, so keeping their field of view clear from ice, rain, and condensation is imperative. Eastprint has partnered with CHASM's AgeNT transparent CNT Hybrid materials which is the only commercially available transparent material capable of delivering the heat density required for these applications without wires.

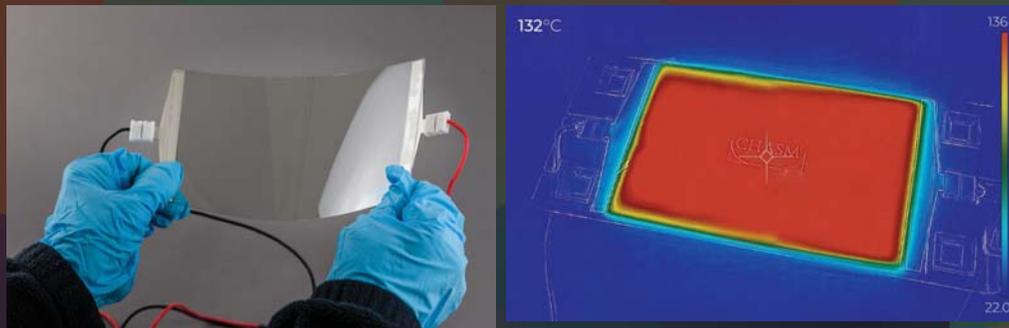


A transparent electric heating film is typically constructed by “sandwiching” a conductive material between layers of glass or clear plastic, traditionally polycarbonate or acrylic. The challenge here is deploying a conductive material that has both sufficient conductivity AND transparency. Patterns or opaque layers affect visual performance, while insufficient conductivity limits heating speed and range. CHASM's AgeNT TCF material is available at <math><10\text{ ohms/square}</math> with greater than 90% visible light transparency, ideal for applications in avionics, transportation electronics, kiosks and more.

## Benefits:

- Flexible, thermoformed for wider range of product designs; integration into headlights and curved glass surfaces
- Up to 3,000 watts/M<sup>2</sup>; meeting specifications for warming time
- Up to 120 Degrees Celsius
- Obstruction free design (no microwire) for optimal pairing with Optical Cameras. RADAR and LiDAR
- Screen Printable: Quick turnaround on circuit design changes and prototypes; just-in-time production runs
- Lower design cost and lower unit cost, no need for laser ablation, deposition and patterning

## Examples of CNT Hybrid Heaters



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