PURDUE INNOVATES | Office of Technology Commercialization

# Multilayer Ablation Resistive High Emissivity Coating for Carbon/Carbon Composites

**Low-cost ceramic coating reduces oxidation and ablation of carbon/carbon composites in hypersonic conditions.**

Carbon/carbon (C/C) composites are a popular material choice for thermal protection in high temperature environments. However, these materials are susceptible to surface damage caused by ablation if left unprotected in high temperature (> 500 deg C) oxidative environments. Researchers at Purdue University have developed a ceramic coating and adhesion technique for C/C composites to prevent direct air contact with the composite surface to minimize ablation and mass loss. The ceramic coating also helps radiate heat away from the surface using a high emissivity layer to reduce surface temperature several hundred deg C. Purdue's approach uses both cost-effective materials and manufacturing techniques. This technology has applications in heat shields for hypersonic and spacecraft reentry vehicles.

### Advantages

Cost effective materials and manufacturing techniques

Minimized mass loss and ablation of C/C composites

Reduced oxidation of C/C composites

### Applications

Heat Transfer / Thermal Management

Hypersonics

Spaceflight

Materials Science

### Technology Validation:

This technology is in the conceptual stages. This technology seeks to improve on a previous coating that reduced surface ablation by 71% in

**Technology ID**
2023-TRIC-70296

**Category**
Aerospace & National Security/Hypersonics & Propulsion Systems
Materials Science & Nanotechnology/Composites & Hybrid Materials
Automotive & Mobility Tech/Micromobility & Smart Urban Infrastructure

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testing of a sample through 2 â€“ 60s ablation processes.

**TRL:** 3

**Intellectual Property:**

Provisional-Gov. Funding, 2023-10-02, United States

Utility-Gov. Funding, 2024-09-19, United States

**Keywords:** ablation, Aerodynamics, Aeronautics, aerospace, carbon/carbon composites, heat shield, Hypersonics, Materials and Manufacturing, Spaceflight, thermal protection systems