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

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Category
Aerospace & Defense/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:

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