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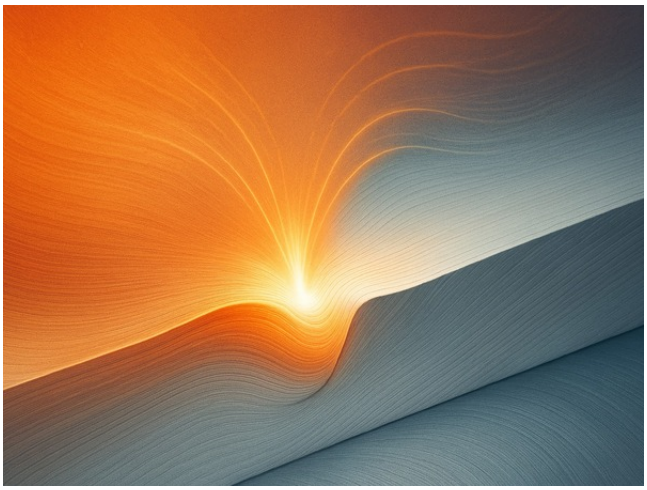
A Novel Approach to Additive Manufacturing of Refractory Metals Without Cracks

Laser cladding plus remelting achieves crack-free CoMoCrSi coatings on Haynes 282 for engines and turbines.



Researchers at Purdue University have developed a method for the crack-free cladding of the refractory alloy CoMoCrSi on Haynes 282, an alloy in jet and rocket engines and industrial gas turbines. When CoMoCrSi is clad onto Haynes 282, it cracks due to differences in temperature and differences in the coefficients of thermal expansion for the two materials. Previous attempts to alleviate this problem involved preheating the substrate. However, preheating the substrate dilutes the coating. The method developed by the Purdue researchers avoids cracking and dilution by combining laser cladding and remelting.

Technology Validation: Unlike the preheating methods used in prior art, the remelting process yielded minimal to no dilution at the surface.

Advantages:

- No dilution of CoMoCrSI

- Crack-free

Technology ID

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Category

Aerospace & Defense/Hypersonics & Propulsion Systems

Materials Science & Nanotechnology/Composites & Hybrid Materials

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

Authors

Kyung-Min Hong

Yung C Shin

Further information

Aaron Taggart

adtaggart@prf.org

View online

- Strong bonding between CoMoCrSi and substrate

- Versatility in size and type of surface for coating

Applications:

- Jet engines

- Rocket engines

- Industrial gas turbines

Publication:

https://www.sciencedirect.com/science/article/abs/pii/S0257897223009118

TRL: 3

Intellectual Property:

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