

Anodization of 3D printed Al-10Si-Mg alloy

U R Rao Satellite Centre (URSC) of Indian Space Research Organisation (ISRO) has developed anodization process on additively manufactured or 3D printed Al-10Si-Mg alloy for spacecraft thermal control applications. The process has been granted Indian patent vide 425670 dtd. 17.03.2023.



Black color novel anodic coating on waveguide

Salient Features

This process on Al-10Si-Mg is carried out in mixture of sulfuric acid and oxalic acid electrolyte in both potentiostatic and galvanostatic mode process, at a temperature of 15-25 °C at a constant current density of 5-30 A/ft² or a constant voltage of 10-50 V with a DC power supply. The thickness of oxide layer formed is $\approx 15 \pm 5 \mu\text{m}$. The oxide coating processed in sulfuric acid-oxalic acid mixture exhibits high infrared emittance ($\epsilon_{\text{IR}} \geq 0.85$) and high solar absorptance ($\alpha_{\text{S}} \geq 0.90$). This indicates that oxide coating on AM Al-10Si-Mg alloy are tending to flat absorbers for better thermal control of spacecraft.

Major Specifications

Thickness of the anodic coating	15±5 μm
Thermo-optical properties	solar absorptance (α_{S}) ≥ 0.90 infrared emittance (ϵ_{IR}) ≥ 0.85
Nano hardness	2.5-3.0 GPa

Technology Transfer

URSC-ISRO offers to transfer this '*anodization process of 3D printed Al-10Si-Mg*' developed by URSC to industries in India with adequate experience and facilities. Industries interested in obtaining knowhow may write giving details of their present activities, infrastructure and facilities.

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