

Qualified baseline for Solar Orbiter main heatshield

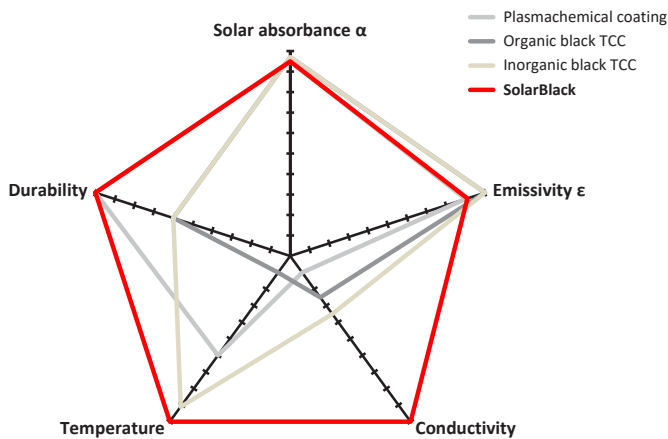
High solar absorption and emissivity

Thermally stable (<-150 to >550°C)

Qualified extreme UV stability

Robust to AIT activities

Dry, non-toxic one-step process



SolarBlack is a thin, highly adherent, black ceramic layer deposited using ENBIO's CoBlast process. Due to its high emissivity and extremely high solar absorbance, the coating can efficiently absorb incoming solar radiation and re-emit it to the surrounding cold medium of space. It has a unique combination of durability, thermal stability, and electrical conductivity, and contains no volatile organic compounds.

CoBlast

Remove the oxide layer

The oxide layer presents a barrier to coating adhesion that must be removed for the application of high performance coatings.

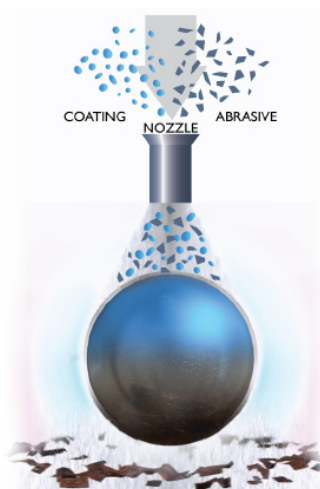
Roughen the metal surface

Roughening the substrate and exposing unreacted metal provides an ideal surface for exceptional coating adhesion.

Apply unique Skins

CoBlast Skins are highly integrated with the substrate. This gives them excellent durability and stability, and allows previously impossible properties to be achieved.

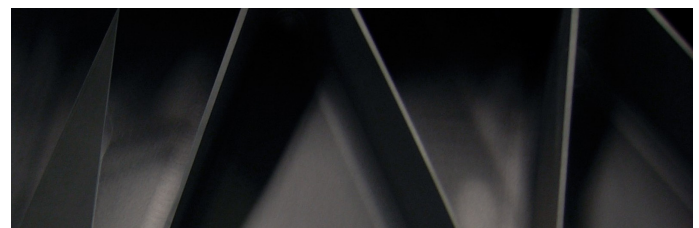
In One Step



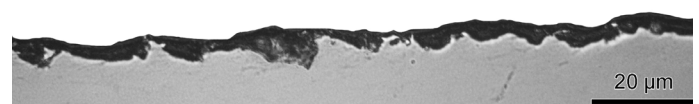
Name	SolarBlack
Application	Thermo-optical
Key Properties	Highly absorptive / emissive
Solar absorption α_s (0.2-2.5 μm)	Ti, BOL 0.93 - EOL 0.94* Al, 0.95 Cu, 0.95 Mg, 0.96 SS 304, 0.96 Inconel, 0.96
Emissivity ϵ_t at 100°C	Ti, BOL 0.74 - EOL 0.76* Al, 0.74 Cu, 0.70 Mg, 0.75 SS 304, 0.75 Inconel, 0.72
Coating density (g/cm^3)	≈ 3.2
Typical thickness (μm)	2-5
Outgassing (%)	CVCM: 0.001 RML: 0.03
Substrates	Titanium, Aluminium, Nitinol Inconel, Magnesium, Steels, Beryllium
Electrical Conductivity	Equivalent to substrate
Adhesion - Peel test	Scotch peel tape test (3M898 strength of 9 N/20 mm)
Adhesion - Pull test	Scotch pull tape test (3M899 strength of 17 N/20 mm)
Cleanability	Can withstand ultrasonic cleaning
Roughness (R_a - μm)	1.6 depending on initial substrate roughness *on Ti, 8000 equivalent sun hours
Total integrated scattering at visible wave length	<5%



Stepped section of SolarBlack coated titanium component



SolarBlack coating on Solar Orbiter



SolarBlack cross section

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