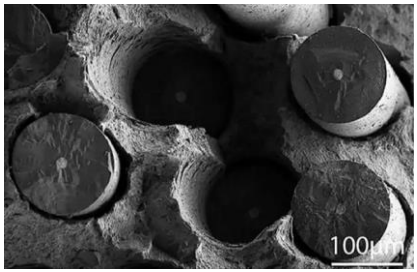
TMC: Titanium Matrix Composite

Reference: TD-DE-1055

TECHNOLOGY DESCRIPTION

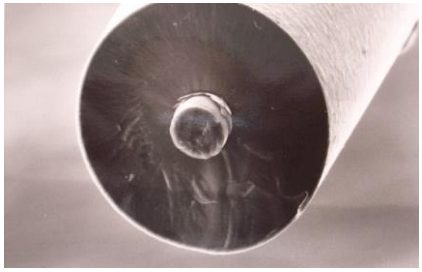
Immense demands are placed on load-carrying materials, especially in the space sector. In addition to low weight, high stiffness and strength are required. The Titanium Matrix Composite (TMC) is a fibre-reinforced composite material in which SiC (silicon carbide) fibres are inserted into a metal matrix of titanium. Together, these form a unit via a gapless form closure (quasi-material closure). Due to the special features of the manufacturing technique (magnetron sputtering process), any titanium alloy can be used as a metal matrix.



INNOVATIVE ASPECTS

The SiC fibres provide the required high stiffness and tensile strength of the composite material. With the titanium matrix, a very low specific weight is achieved. In contrast to other lightweight materials, TMC retains ist material properties even at high temperatures (up to ~600°C). In addition, since the SiC fibres do not protrude from the matrix, TMC retains both its corrosion resistance and biocompatibility.

- Density: 4 g/cm3
- Strength: 2,200 MPa (room temperature)
- Stiffness: 210 GPa
- Thermal expansion: 5.0 · 10-6 K-1



TECHNOLOGY READINESS (in space application)

TRL 9 (2024)

COUNTRY OF ORIGIN

Germany

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TAGS #titanium #composite #metal matrix #low weight #high stiffness #high strength

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