

Advanced materials & ceramic matrix composites

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Technology abstract

An Italian company, active in the space sector, is proposing fibre reinforced preceramics having all the advantages showed by fibre reinforced plastics. Furthermore, the proposed fibre reinforced preceramics have synthetic characters until 500°C and pseudo synthetic

characters until 3000°C (Vacuum).

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Technology Description

The fibre reinforced preceramics herein proposed have synthetic characters until 500°C and pseudo synthetic characters until 3000°C (Vacuum). The donor formulates the matrices according to chemical requirements to protect composites against aggressive atmospheres or liquids. Two kinds of preceramic and ceramic materials can be realised. COMPOSITES are ceramic matrix composites; COMPOSIT-C is a PAN carbon fibre reinforced preceramic that is developed to substitute carbon products. The advantages of COMPOSIT-C are multiple:

- Weight reduction 5 times comparing to steel, ?
- Terms of manufacturing COMPOSIT-C products are possible within 1 week, much faster than CCC products with at minimum 2month,
- Energy investment is reduced to the minimum, because of the lower temperature manufacturing Process, ?
- Faster individual moulding and shaping, ?
- Matrix reduction at 1000°C in Vacuum lower than 4%, ?
- Matrix reduction at 2400°C in Vacuum lower than 15%.

Innovations & Advantages

The preceramic and ceramic materials herein proposed are characterised by:

- Lightweight materials with outstanding mechanical and thermal qualities.
- Ultraviolet and microwave resistant materials with insulating qualities or electrical conductivity.
- Integral parts can be manufactured much faster than carbon fiber reinforced carbon materials or ceramic matrix composites.
- Lower energy investment for manufacturing of such products.
- More flexibility for moulding and shaping of parts.
- Maximum temperature resistance of 3000°C in vacuum or non oxygen applications.

Further Information

Current and Potential Domains of Application

The ceramic matrix composites and fibre reinforced preceramics are used for high temperature applications. High temperature and wear resistant fibre reinforced synthetics and ceramics are currently applied for reentry vehicles thermal protection in the aerospace, aeronautics field could also be applied in:

- Furnaces for vacuum processing
 - Racks and shelves for tool processing and hardening
 - Profiles, rings and tubes for special process
 - Heating elements
 - Plasma processing
 - Photovoltaic processing
 - Absorption of high frequency radiation
 - Protection against damage caused by projectiles, mines and similar
 - Parts with high electrical conductivity
 - Insulating parts.
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