# Production process of reinforced ceramic composite materials with ceramic fibers.

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### **KEYWORDS**

- □ PRODUCTION PROCESS
- □ COMPOSITE MATERIALS
- □ PYROLYSIS PROCESS **OPTIMIZATION**
- GENETIC ALGORITHM
- □ CARBON / CARBON

#### AREA

□ NANO-TECHNOLOGIES & MATERIALS

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Patent Type Patent for invention.

### **Co-Ownership** Sapienza University of Rome 50%, Italian Space Agency 50%.

Inventors Marta Albano, Mario Marchetti, Davide

Industrial & Commercial Reference Ceramic composite materials for high temperature applications

#### Time to Market

Micheli.

Process developed, to stabilize at industrial plant. Time to market about a year.

## **Availability**

Cession, Start-up and Spin-off.



#### Abstract

Production process of reinforced ceramic composite materials with ceramic fibers able to withstand very high temperatures, with excellent thermal stability and high mechanical resistance up to temperatures of 1500° C.



Fig. 1 Calculation example for optimal parameters based on the percentage of initial fibers.

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# Production process of reinforced ceramic composite materials with ceramic fibers.

#### **Technical Description**

Production process of reinforced ceramic composite materials with ceramic fibers able to withstand very high temperatures, with excellent thermal stability and high mechanical resistance up to temperatures of 1500 ° C.

This process combines various fluid infiltration techniques, both liquid and gaseous, and optimizes process parameters according to the percentage of preform fiber.

This ensures complete transformation of the precursor into the carbon matrix in a minimum time and temperature.

#### **Technologies & Advantages**

Efficient, reliable, simple, and economical process to manufacture composite materials having excellent mechanical strength properties Loads and stress and excellent thermal properties due to the very low Thermal conductivity, including high resistance to stress and thermal excursions, keeping production time short enough to allow a significant productivity.

### Applications

C/C and C/SiC ceramic fiber reinforced ceramic matrix composites have good thermal and mechanical properties at high temperatures and are characterized by good oxidation resistance and thermal shocks.

Thanks to these properties, such composite materials are increasingly applied, for example, in the aeronautical industry, the space industry, and also in the nuclear and automotive industry.

Such materiales are widley used, for example, as thermal protections for space re-entry vehicles (eg capsules and hypersonic aircraft), as brake material in the rail and car industry, and in the nuclear industry in the reactors.

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