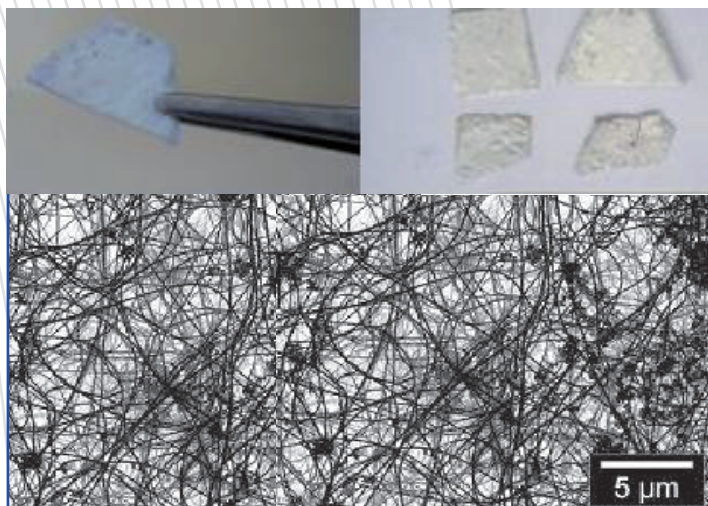


High quality Si-based nanowire

The laboratory has developed a process for the production of high quality Si-based nanowire. With a yield up to 100 times higher than usual one, the patented process is cheaper and allows multi-layer coating of the nanofibre. Moreover, no specific equipment is needed (a tubular oven is used).



Applications

Mechanics:

- nano-composite materials (embedded in a matrix, such as polymer, ceramic or metal, with a wide range of colour available)
- multi-functional composite material (with wide choice of coating)
- thermostructural product (low and high temperature: 1000°C under oxydative atmosphere and 1600°C under controlled atmosphere)

Opto-electronics: miniaturisation of SiC-based device

Nano-EMS (Nano-ElectroMechanical Systems):

- nanowire for MEMS in the nanoscale
- nanosensors for high pressure, high temperature and under severe conditions

Aeronautics (experimental stealth technology)

Polishing and Machining (high quality)

Base for Catalysts

Intellectual property

Patents pending in EP, PCT

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Research team

David Cornu

Laboratoire des Multimatériaux et Interfaces (LMI)

UMR 5615: Université C. Bernard Lyon 1 - CNRS

Detailed description

The process requires usual and cheap reagents (sand..) and occurs in a standard tubular oven. The growth of the nanowire is carried out in the absence of catalyst. The growth temperature reaches 1400°C. A graphite growth support is used.

The nanowire is obtained by reacting a carbon derivative in gaseous phase, a silicon derivative in gaseous phase or optionally a nitrogen derivative in gaseous phase.

The process allows the growth of nanowires composed of, for example, cubic silicon carbide (Beta-SiC), trigonal silicon nitride (Alpha-Si₃N₄) or mixed Beta-SiC and Alpha-Si₃N₄.

The long nanorods produced are highly pure because no catalyst is needed. Moreover, no residual particle appears during the process.

Advantages / Novelty

The patented process is cheap for three reasons :

- the raw material is not expensive and widely available (sand..)
- the equipment needed is commun (tubular oven)
- the yield is 10 to 100 times higher than usual processes (those by «template», by nucleation or «ball milling»).

Moreover, the process, directly transferable to industry, allows the multi-layer coating of the nanofibre.

Documentation

<http://www.si-based-nanowire.com>

Collaboration type

Lyon Science Transfert offers to grant patent licence on production of high quality Si-based Nanowire.

CONTACT

Philippe Roussel

Tel. +33 (0) 4 37 37 42 98

philippe.roussel@universite-lyon.fr