

PROCESS FOR MANUFACTURING A COMPOSITE STRUCTURE COMPRISING A THIN LAYER MADE OF MONOCRYSTALLINE SiC ON A CARRIER SUBSTRATE MADE OF SiC

ABSTRACT

The invention relates to a process for manufacturing a composite structure comprising a thin layer made of monocrystalline silicon carbide arranged on a carrier substrate made of silicon carbide, the process comprising:

- a) a step of providing a donor substrate made of monocrystalline silicon carbide,
- b) a step of ion implantation of light species into the donor substrate, to form a buried brittle plane delimiting the thin layer between said buried brittle plane and a free surface of said donor substrate,
- c) a succession of n steps of forming crystalline carrier layers, with n greater than or equal to 2; the n crystalline carrier layers being positioned on the front face of the donor substrate successively one on the other, and forming the carrier substrate; each formation step comprising:
 - direct liquid injection chemical vapour deposition, at a temperature below 900°C , to form a carrier layer, said carrier layer being formed by an at least partially amorphous SiC matrix, and having a thickness of less than or equal to 200 microns;
 - a crystallization heat treatment of the carrier layer, at a temperature of less than or equal to 1000°C , to form a crystalline carrier layer;
- d) a step of separation along the buried brittle plane, to form, on the one hand, a composite structure comprising the thin layer on the carrier substrate and, on the other hand, the rest of the donor substrate.

Fig. 2d