

CLAIMS

1. A process for fabricating a composite structure comprising a thin layer of single-crystal silicon carbide, SiC, positioned on a polycrystalline SiC carrier substrate, comprising the following steps:

- forming a polycrystalline SiC layer on a donor substrate, at least a surface portion of which is made of single-crystal SiC,
- before or after said forming, implanting ionic species in said surface portion of the donor substrate, so as to form a plane of weakness delimiting a thin single-crystal SiC layer to be transferred,
- after said implanting and said forming, bonding the donor substrate and the polycrystalline SiC carrier substrate the polycrystalline SiC layer being at the bonding interface, and detachment of the donor substrate along the plane of weakness, so as to transfer the polycrystalline SiC layer and the thin single-crystal SiC layer onto the polycrystalline SiC carrier substrate.

2. The process according to Claim 1, in which the polycrystalline SiC layer has a polytype identical to that of the carrier substrate.

3. The process according to Claim 1 or 2, in which the formation of the polycrystalline SiC layer comprises a deposition of polycrystalline SiC.

4. The process according to Claim 3, in which the deposition of polycrystalline SiC is a chemical vapour deposition.

5. The process according to Claim 3 or 4, in which the deposition of polycrystalline SiC is carried out at a temperature below 1000°C.

6. The process according to Claim 1 or 2, in which the formation of the polycrystalline SiC layer comprises a deposition of an amorphous SiC layer and a recrystallization annealing applied to the amorphous SiC layer.

7. The process according to one of Claims 1 to 6, in which the polycrystalline SiC layer formed on the donor substrate has a thickness of between 10 nm and 10 μm .

8. The process according to one of Claims 1 to 7, further comprising a thinning and/or a polishing of the surface of the polycrystalline SiC layer intended to be at the bonding interface during the bonding and/or of the surface of the carrier substrate intended to be at the bonding interface during the bonding.

9. The process according to one of Claims 1 to 8, further comprising the formation of a bonding layer on each of the donor and carrier substrates, said bonding being carried out by direct bonding of the bonding layers thus formed.

10. The process according to Claim 9, in which the bonding layer formed on each of the donor and carrier substrates is a metal layer, for example a layer of tungsten or a layer of titanium.

11. The process according to Claim 9, in which the bonding layer formed on each of the donor and carrier substrates is a layer of silicon, of carbon or of silicon carbide.

12. The process according to one of Claims 9 to 11, in which the bonding layer has a melting point below a temperature of an annealing applied during the bonding step.