

Method for production of an SOI structure which in particular is designed for photonic applications, and support substrate for the said structure

ABSTRACT

The invention concerns a method for production of an SOI structure, comprising the following steps:

a) supply of an initial monocrystalline silicon substrate, with an interstitial oxygen content of between 15 and 27 ppma, in accordance with the standard ASTM'79, and resistivity lower than 200 ohms.cm, with the initial substrate being designed to form a support substrate for the SOI structure after having undergone the subsequent step b);

b) implementation of a sequence of heat treatments to the initial substrate while, at least on a front face, it is without a layer of silicon oxide, other than optionally a layer of native oxide, the said sequence consisting of:

- a first heat treatment defined by a plateau at a temperature higher than 1200°C and lower than 1280°C, and with a duration of between 1 second and 60 seconds, by a temperature decrease ramp of between 10°C/s and 70°C/s, and by an atmosphere of an argon or argon-hydrogen type, followed by:

- a second heat treatment defined by a plateau at a temperature of between 900°C and 1100°C, without a step before this temperature, under a neutral or oxidising atmosphere,

in order to form a support substrate comprising:

- a denuded surface layer, with a thickness greater than 40µm, and having a concentration of micro-defects (BMD) lower than $10^8/\text{cm}^3$; and

- an enriched deep layer, below the denuded surface layer, with a concentration of micro-defects (BMD) of between $2.10^8/\text{cm}^3$ and $5.10^{10}/\text{cm}^3$.

The invention also concerns a support substrate and an SOI structure including the said support substrate.

Fig 3