SUMMARY OF INVENTION

Technical Problem

[0008]

~~An object~~ Embodiments of the invention, which has been made under the above-mentioned circumstances, ~~is~~seek to provide a composite substrate comprising an inorganic insulating sintered body substrate which is opaque to visible light, has high heat conductivity and a low loss in the high-frequency region, and is cheap, and a single crystal semiconductor thin film deposited thereon, the composite substrate being suppressed in contamination with metal impurities from the sintered body.

Solution to Problem

[0009]

The inventors have found that the above object is effectively attained by providing a composite substrate comprising an inorganic insulating sintered body substrate having a heat conductivity of at least 5 W/m·K and a volume resistivity of at least 1×10^{8} Ω·cm, a single crystal semiconductor film, and optionally, a thin layer of oxide, nitride or oxynitride disposed between the inorganic insulating sintered body substrate and the single crystal semiconductor film.

[0010]

~~Specifically,~~ According to an aspect of the present invention, there is provide~~d~~ ~~a composite substrate as defined below.~~

~~[1] A~~ a composite substrate comprising an inorganic insulating sintered body substrate having a heat conductivity of at least 5 W/m·K and a volume resistivity of at least 1×10^{8} Ω·cm, a single crystal semiconductor film, and optionally, a thin layer disposed between the inorganic insulating sintered body substrate and the single crystal semiconductor film, said

thin layer being composed of at least one component selected from among an oxide, nitride, and oxynitride.

~~[2] The composite substrate of [1] wherein s~~Said thin layer ~~is~~ may be formed to cover the inorganic insulating sintered body substrate in entirety.

~~[3] The composite substrate of [1] or [2] wherein t~~The inorganic insulating sintered body ~~is~~ may be silicon nitride, aluminum nitride or SiAlON.

~~[4] The composite substrate of any one of [1] to [3] wherein t~~The single crystal semiconductor ~~is~~ may be single crystal silicon.

~~[5] The composite substrate of any one of [1] to [4] wherein s~~Said thin layer ~~is~~ may be a film of high purity SiO_2, Si_3N_4, or SiO_xN_y wherein $0 < x < 2$ and $0 < y < 1.3$, deposited by an electron beam evaporation or chemical vapor deposition method.

~~[6] The composite substrate of any one of [1] to [4] wherein s~~Said thin layer ~~is~~ may be of silicon nitride deposited by a chemical vapor deposition method.

~~[7] The~~ Said composite substrate ~~of any one of [1] to [6],~~ may further compris~~e~~~~ing~~ a layer of polycrystalline or amorphous silicon on at least the back surface of the composite substrate.

Advantageous Effects of Invention

[0011]

According to embodiments of the invention, a cheap composite substrate which is suppressed in contamination with metal impurities ~~is~~ may be provided at a low cost by using an inorganic insulating sintered body which ~~is~~ may be opaque to visible light, ~~has~~ may have high heat conductivity and a low loss in the high-frequency region, and ~~is~~ may be cheap.

BRIEF DESCRIPTION OF DRAWING

[0012]

FIG. 1 is a diagram showing the construction of a composite substrate according to one embodiment of the invention.