PURPOSE OF THE INVENTION

Embodiments of the invention therefore seek to propose a method of manufacturing a hybrid structure and find a solution to the disadvantages of the former art. Embodiments of the invention seek to propose a method for applying a required heat treatment without damaging the hybrid structure.

BRIEF DESCRIPTION OF THE INVENTION

An aspect of the invention provides a method of manufacturing a hybrid structure comprising an effective layer of piezoelectric material that has an effective thickness disposed on a support substrate with a support thickness and a coefficient of thermal expansion less than that of the effective layer. The method comprises:

a) A step of providing a bonded structure comprising a donor substrate of piezoelectric material and the support substrate, the bonded structure having a bonding interface between these two substrates;

b) A first step of thinning the donor substrate to form a thinner layer, having an intermediate thickness, disposed on the support substrate; the assembly forming a thinned structure;

c) A heat treatment step of the thinned structure at an annealing temperature;

d) A second thinning step, after step c), of the thinned layer to form the effective layer;

the method being remarkable in that it comprises, prior to step b), a step a') of determining a range of intermediate thicknesses avoiding a degradation of the thinned structure (6') during the step c), the range being defined by a threshold

upper threshold thickness at maximum thickness or maximum thickness lower than the effective thickness;

- Recycling step a'' comprises a separation at the bonding interface of the bonded structure;
- Recycling step a'') comprises the reuse of the donor and support substrates resulting from the separation for a new step a) of providing a bonded structure;
- The second thinning step d) may further comprise a step of thinning the support substrate;
- The effective layer is composed of a material chosen from: lithium tantalate ($LiTaO_3$), lithium niobate ($LiNbO_3$), aluminium nitride (AlN), zinc oxide (ZnO);
- The support substrate is composed of a material chosen from the group: silicon, III-V semiconductors, silicon carbide, glass, sapphire;
- The support substrate comprises one or more surface layers.

Another aspect of the invention provides a hybrid structure comprising an effective layer of piezoelectric material with an effective thickness of less than 50 microns assembled to a support substrate having a coefficient of thermal expansion less than that of the effective layer, the hybrid structure being characterized in that a bonding interface between the effective layer and the support substrate has a bonding energy greater than 1000 mJ/m2 and at least one non-bonded zone whose size is between 1 and 1000 microns.

BRIEF DESCRIPTION OF THE DRAWINGS

Other characteristics and advantages of the invention will emerge from the detailed description of the invention which follows in the References to the accompanying drawings in which: