

SEMI M14-89

SPECIFICATION FOR ION IMPLANTATION AND ACTIVATION PROCESS FOR SEMI-INSULATING GALLIUM ARSENIDE SINGLE CRYSTALS

This Standard was technically approved by the Silicon Wafer Global Technical Committee. Originally published in 1989.

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1 Scope

1.1 The purpose of this Standard is to present a process for ion implantation, activation, and measurement of the resulting layers so that meaningful comparisons can be made between various lots of semi-insulating GaAs. This test will be performed by the supplier so that product may be represented in a standard way.

NOTE 1: This is intended to be an interim procedure for use until a standard test method is developed by ASTM.

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2 Process

2.1 Candidate lots must pass SEMI GaAs specifications for resistivity, mobility, and thermal stability using standard ASTM referee techniques.

2.2 Implantation Process

2.2.1 *Surface Preparation* — The surface treatment shall be designed to remove residual oxide.

2.2.2 *Implant Angle Energy Species and Dose* — An energy of 150 keV using Si₂₉ to a dose of $2 \times 10^{12}/\text{cm}^2$ and a tilt of 11° to 13° from the (100) toward the (110).

2.3 Activation Process

2.3.1 *Surface Preparation* — No chemical treatment should be performed prior to activation.

2.3.2 *Activation* — The samples shall be subjected to a temperature of 850°C for 10 minutes with a second proximity wafer directly in contact with the implanted surface. The proximity wafer shall be identical to the subject wafer except not subjected to ion implantation. The ambient of the furnace shall be a gas such as nitrogen or argon.

2.4 Layer Evaluation

2.4.1 Evaluation of the activated samples shall be based upon CV profiling, mobility, and resistivity as specified according to standard ASTM techniques.



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