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Test methods of crystalline defects in silicon by preferential etch techniques

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS H 0609** : 1994 is replaced with this Standard.

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Test methods of crystalline defects in silicon by preferential etch techniques

Introduction This Japanese Industrial Standard has been established to specify the test methods of determining crystalline defects in silicon using preferential etch techniques. Defects in silicon single crystalline affect yield and performance seriously in semiconductor integrated circuits. Traditionally, etching solution which include hexavalent-chromium in large quantities had been used for detection of such defects in silicon single crystal. However, we decided to change direction to etching solution which is hexavalent-chromium-free for environmental protection in 1994. Though this etching solution without hexavanlent-chromium was unable to be applied to single crystalline of low resistivity, we established an optimized standard for such low resistivity ones because we had forecast the increase of the utilization of epitaxtial wafers using single crystalline of low resistvity substrates.

1 Scope This Standard specifies the detection of crystalline defects in silicon by preferential etch techniques with hexavalent-chromium-free etching solution. The objects are single crystal wafer, epitaxial wafer, and its thermally oxidized wafers. The surface crystal orientations are {100}, {111} and {511}.

Remarks : The types of wafers dealt with in this Standard are as follows:

a) **single crystal wafer** sliced, lapped, and mirror-polished single crystal wafers

b) **epitaxial wafer** epitaxial-grown wafers

c) **thermal oxidized wafer** wafers of a) and b) that are thermally oxidized

For above wafers, applicable etching solutions differ by the resistivity. Preferential etching solution (I) in **5.3 b)** applies to high resistivity wafers of more than 0.02 Ω cm, and preferential etching solution (II) in **5.3 c)** applies to low resistivity wafers not exceeding 0.02 Ω cm.

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of publication is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative references without the indication of the year of publication apply limiting only to the most recent edition.

JIS K 8355 : 1994 *Acetic acid*

Remarks : ISO 6353-2: 1983, R1 is equivalent to the said standard.

JIS K 8541 : 1994 *Nitric acid*

Remarks : ISO 6353-2 : 1983, R19 is equivalent to the said standard.

JIS K 8550 : 1994 *Silver nitrate*

Remarks : ISO 6353-2 : 1983, R28 is equivalent to the said standard.

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