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Test method for the gloss of silicon wafers

硅片表面光泽度的测试方法

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents" Drafting. Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents. This document is jointly developed by the National Semiconductor Equipment and Materials Standardization Technical Committee (SAC/TC203) and the National Semiconductor Equipment and Materials Standards It was jointly proposed and coordinated by the Materials Sub-Technical Committee of the Chemistry Technical Committee (SAC/TC203/SC2). This document was drafted by: Zhejiang Jinruihong Technology Co., Ltd., Zhejiang Haina Semiconductor Co., Ltd., Nonferrous Metal Technology Co., Ltd. Ji Research Institute Co., Ltd., Tianjin Zhonghuan Leading Materials Technology Co., Ltd., Shandong Youyan Semiconductor Materials Co., Ltd., Shanghai Synthetic Silicon Materials Co., Ltd., Mesker Electronic Materials Co., Ltd., Guangdong Jinwan Gaojing Solar Technology Co., Ltd., Zhejiang Xusheng Electronics Co., Ltd., Chaohu University, Jinruihong Technology (Quzhou) Co., Ltd. The main drafters of this document. Liang Xingbo, Li Qin, Zhang Haiying, Lin Songqing, Pan Jinping, Li Suqing, Zhang Xueyuan, You Bailing, Bian Yongzhi, Zhuang Zhihui, Shen Huihui, Jiao Erqiang, Han Yunxiao, Xu Zhiqun, Fu Mingquan, Zhan Yufeng, Wang Kesheng. Test method for silicon wafer surface gloss

1 Scope

China's national test method for the surface gloss of silicon wafers. Gloss measures specular reflection, and on a silicon wafer it is a quick proxy for the surface condition that matters: a properly polished wafer reflects almost perfectly, and any departure - residual saw damage, incomplete polishing, haze from etching, particulate contamination or oxide non-uniformity - scatters light and reduces the reading. That makes it a fast, non-contact, whole-wafer inspection that needs no special instrument, and it is used as an incoming and in-process check rather than as a characterisation. It does not replace the atomic force

microscopy or the laser scattering that measure roughness and defects quantitatively; what it does is catch a batch that has gone wrong before it consumes a day of processing, which for a material this expensive is worth having as a routine measurement.

This document describes a method for testing the surface gloss of silicon wafers using the light reflection method at 20°, 60° or 85° geometries. This document is suitable for testing the surface gloss of silicon etched wafers, polished wafers, and epitaxial wafers. It is not suitable for testing silicon wafers with patterns on the surface.

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document.

GB/T 9754 Determination of 20°, 60° and 85° specular gloss of paint and varnish films containing no metallic pigments

GB/T 14264 Semiconductor material terminology JJG696-2015 Mirror gloss meter and gloss plate

3 Terms and definitions

The terms and definitions defined in GB/T 9754 and GB/T 14264 and the following apply to this document.

3.1 gloss For a specified light source and acceptance angle, the luminous flux reflected from the specular direction of an object is the same as the specular direction of black glass with a refractive index of 1.567. The ratio of reflected light flux. Note

1. In order to determine the scale of specular gloss, the gloss value is specified for polished black glass with a refractive index of

1.567 at geometric angles of 20°, 60° and 85°. is 100. Note

2. The evaluation of the glossiness of the back side of the double-sided silicon polished wafer is calculated based on the glossiness of the front side of the polished wafer.

4 Method Principles

Under the conditions of the specified incident angle and the specified beam, the incident light shines on the sample surface through the lens, and the light in the direction of the specular reflection angle is obtained. Beam, at this time, the reflected light intensity is determined by the surface properties of the sample material. The receiver collects the

sample reflected light and compares it with the standard surface reflected light intensity. Calculate and finally obtain the surface gloss of the sample. The schematic diagram of the glossiness test light path is shown in Figure 1.

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