

Procedural Review Voting Sheet 2014 Cycle 3

REGION: **North America**
 COMMITTEE: **Silicon Wafer**
 EVENT: **SEMICON West 2014**
 DATE OF MEETING: **07/08/2014**
 PLACE OF MEETING: **Marriott Hotel, San Francisco, California**
 COMMITTEE CO-CHAIRS: **Dinesh Gupta (STA), Noel Poduje (SMS)**
 SEMI STAFF: **Kevin Nguyen**

A&R Voter: Name/Company
 Date: 200X/MM/DD

I. Document Number & Title

Document 5707	Revision of SEMI M40-1109 With Title Change To: Guide for Measurement of Roughness of Planar Surfaces on Polished Wafers
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II. Tally (Staff to fill in)

Voting Tally: **As-cast tally after close of voting period**

A minimum of 60% of the voting interests that have voting members within the technical committee must return votes. (Regulations ¶ 9.6.1)

	Return		Distribution		Return Rate	
Yellow	62	÷	92	=	67.4%	>=60%
Lilac & Others	33					
Total Vote	95					
Reject	0					
Accept	38					

A&R	Not approved
	Reason:

III. Rejects

There was no reject received for ballot 5707.

IV. Comments

Comment 1

Comment	Referenced Section	*TF/Committee to fill in if necessary
	From	Thomas Germer, NIST
	Comment	Accept with comment This document adds a transparent material (sapphire) to the list of those for which this guide applies. Have the laser light scattering methods been evaluated for use with these materials? Laser light scattering from transparent materials can present a number of issues (multiple reflections, bulk scattering, back side scattering, etc.) that make the determination of roughness uncertain. These issues will depend quite a bit on the design of the scatterometer. I do not believe that one can simply add transparent materials to the list without adding caveats to the laser light scattering techniques.
	Discussion	Comment is valid. Two notes are proposed in the summary of editorial change section below for clarification.
Action proposed	<input checked="" type="checkbox"/>	The committee agreed to do one of the following actions.
		*No motion is required in this step.
	<input type="checkbox"/>	No further action was taken by the committee.
	<input type="checkbox"/>	Refer to the task force for more consideration.
	<input type="checkbox"/>	New Business
	<input checked="" type="checkbox"/>	Other
	Editorial Change	
	<input checked="" type="checkbox"/>	Case 1: No vote in this section :
		To be included and voted on in § 5. Summary of Editorial Changes.
	<input type="checkbox"/>	Case 2: Voted in this section :
	Original section number and at least one full sentence are required in "FROM" and "TO" fields.	
1	FROM: Section xxx	
	To: Section xxx	
	Justification (if necessary)	

	2	FROM: Section xxx
		To: Section xxx
		Justification (if necessary)
Motion by/2nd	Name (Company)/Name (Company)	
Vote	XX-XX Motion passed (or failed)	
A&R		Not approved
		Reason:

Comment 2

Comment	Referenced Section	*TF/Committee to fill in if necessary
	From	Peter Wagner, PWC
	Comment	Accept with comment 1. I understand that the title does not contain "silicon" anymore because this guide also may apply to wafers of other materials. However, I do not understand why the guide now should be limited to polished wafers. Several of the methods described in the document can also be used for measuring the roughness of as-cut, etched, lapped or ground surfaces. This change should be re-considered.
	Discussion	Comment is appreciated. No change is required.
Action proposed	x	The committee agreed to do one of the following actions. *No motion is required in this step.
	x	No further action was taken by the committee.
		Refer to the task force for more consideration.
		New Business
		Other
		Editorial Change
		Case 1: No vote in this section : To be included and voted on in <u>§ 5. Summary of Editorial Changes.</u>
		Case 2: Voted in this section : Original section number and at least one full sentence are required in "FROM" and "TO" fields.
	1	FROM: Section xxx

		To: Section xxx
		Justification (If necessary)
	2	FROM: Section xxx
		To: Section xxx
		Justification (If necessary)
Motion by/2nd	Name (Company)/Name (Company)	
Vote	XX-XX Motion passed (or failed)	
A&R	<input type="checkbox"/>	Not approved
	Reason:	

Comment 3

Comment	Referenced Section	*TF/Committee to fill in if necessary
	From	Peter Wagner, PWC
	Comment	Accept with comment 2. End of 7.3.4: remove "(Stover)" and add an upper index "6" for the footnote.
	Discussion	Editorial change is needed.
Action proposed	<input checked="" type="checkbox"/>	The committee agreed to do one of the following actions. *No motion is required in this step.
	<input type="checkbox"/>	No further action was taken by the committee.
	<input type="checkbox"/>	Refer to the task force for more consideration.
	<input type="checkbox"/>	New Business
	<input checked="" type="checkbox"/>	Other
	Editorial Change	
	<input checked="" type="checkbox"/>	Case 1: No vote in this section : To be included and voted on in § 5. Summary of Editorial Changes.
<input type="checkbox"/>	Case 2: Voted in this section : Original section number and at least one full sentence are required in "FROM" and "TO" fields.	

1	FROM: Section xxx
	To: Section xxx
	Justification (if necessary)
2	FROM: Section xxx
	To: Section xxx
	Justification (if necessary)
Motion by/2nd	Name (Company)/Name (Company)
Vote	XX-XX Motion passed (or failed)
A&R	Not approved
	Reason:

Comment 4

Committee	Referenced Section	*TF/Committee to fill in if necessary
	From	Murray Bullis, Materials & Metrology

Comment	<p>In reviewing the copy for document 5707, I missed an error in the text of the document. The first paragraph after the header of ¶7.5 has no paragraph number and is in the wrong font. This section of the document should have been as follows, which is unchanged from the existing published text:</p> <p><i>7.5 Angle-resolved Light Scatterometers (ARLS)</i></p> <p><u>7.5.1</u> The high spatial frequency limit of this technique is defined by incident and scattering angles and the illumination wavelength used.</p> <p>7.5.1<u>7.5.2</u> The low spatial frequency limit is given by</p> <ul style="list-style-type: none"> • the above equations (for incidence angle), • the diameter of the incident illumination spot at the wafer surface, • the solid collection angle of the optical system, and • the smallest angular distance allowed by the instrument between specular reflected light and the detector. <p>7.5.2<u>7.5.3</u> The roughness may be measured by using a fixed incidence angle and by recording the intensity of scattered light at various scattering angles in the plane of incidence. The two-dimensional PSD curve of the surface can then be calculated from the angular spectrum of the scattered light (BRDF). The rms (micro)roughness, R_q, as well as the rms slope, m_q, may be calculated from a one-dimensional or isotropic power spectral density (PSD) curve for a given spatial bandwidth as long as the above mentioned limits are accommodated.</p> <p>7.5.3<u>7.5.4</u> Such tools may be able to access a spatial bandwidth range of about one-half the wavelength of the illuminating light up to several hundred μm.</p>	
	Discussion	Formatting error. Corrections are proposed in the Summary of Editorial Changes section below.
Action proposed	<input checked="" type="checkbox"/>	The committee agreed to do one of the following actions.
		*No motion is required in this step.
		No further action was taken by the committee.
		Refer to the task force for more consideration.
		New Business
	<input checked="" type="checkbox"/>	Other
	Editorial Change	
<input checked="" type="checkbox"/>	Case 1: No vote in this section :	
	To be included and voted on in § 5. Summary of Editorial Changes.	
	Case 2: Voted in this section :	
	Original section number and at least one full sentence are required in "FROM" and "TO" fields.	

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1	FROM: Section xxx
	To: Section xxx
	Justification (if necessary)
2	FROM: Section xxx
	To: Section xxx
	Justification (if necessary)
Motion by/2nd	Name (Company)/Name (Company)
Vote	XX-XX Motion passed (or failed)
A&R	Not approved
	Reason:

V. Summary of Editorial Changes

Note: Original section number and at least one full sentence are required in “FROM” and “TO” fields.

1	<p>TO: After Section 2.6, add these two notes</p> <p><u>NOTE 1: Optical methods (optical profilometry, interferometry, and scatterometry) applied to transparent materials present a variety of issues that must be considered to characterize roughness on the surface of interest without undue influence by roughness of the opposite surface, and/or scattering from the bulk material.</u></p> <p><u>NOTE 2: This Guide is primarily concerned with polished materials, but it should be noted that the methodologies discussed herein also have application to rougher surfaces, such as as-sawn, ground, etched, and lapped Si wafers.</u></p> <p>Justification: Notes added for clarification. No technical change is introduced. Addition of notes is editorial changes.</p>
	<p>FROM: Section 7.3.4 Also, the slope of the PSD curve can be important in certain situations (Stover).</p> <p>TO: Section 7.3.4 Also, the slope of the PSD curve can be important in certain situations⁶ (Stover).</p>
	<p>2</p> <p>Justification: Editorial correction. Footnote 6 is already appear at the bottom of the page in the ballot that read</p> <p>⁶Stover, J. C, Optical Scattering, Measurement and Analysis, Second Edition, (SPIE Optical Engineering Press, Bellingham, WA. 1995), p. 79.</p>

TO: Add missing section number 7.5.1 and readjust the following section numbers as indicated below.

7.5 *Angle-resolved Light Scatterometers (ARLS)*

~~7.5.1~~ The high spatial frequency limit of this technique is defined by incident and scattering angles and the illumination wavelength used.

~~7.5.1~~ ~~7.5.2~~ The low spatial frequency limit is given by

- the above equations (for incidence angle),
- the diameter of the incident illumination spot at the wafer surface,
- the solid collection angle of the optical system, and
- the smallest angular distance allowed by the instrument between specular reflected light and the detector.

~~7.5.2~~ ~~7.5.3~~ The roughness may be measured by using a fixed incidence angle and by recording the intensity of scattered light at various scattering angles in the plane of incidence. The two-dimensional PSD curve of the surface can then be calculated from the angular spectrum of the scattered light (BRDF). The rms (micro)roughness, R_q , as well as the rms slope, m_q , may be calculated from a one-dimensional or isotropic power spectral density (PSD) curve for a given spatial bandwidth as long as the above mentioned limits are accommodated.

~~7.5.3~~ ~~7.5.4~~ Such tools may be able to access a spatial bandwidth range of about one-half the wavelength of the illuminating light up to several hundred μm .

Justification:

Formatting error. Add missing section number for 7.5.1

Motion	To approve the above editorial changes
Motion by/2nd by	Kurt Haller (KLA-Tencor)/Masami Ikota (Hitachi High Tech)
Discussion	None
Vote	15-0 Motion passed
A&R	Not approved
	Reason:

VI. Approval Conditions Check

APPROVAL CONDITION 1: All negatives have been discussed and were withdrawn, found not related, or not persuasive. (Regulations ¶ 9.6.2)

APPROVAL CONDITION 2: At least 90% of the sum of the valid accept and reject votes must be accept. (Regulations ¶ 9.6.3)

Note: if both approval conditions are not satisfied, the document fails.

	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">Accepts</div> <div style="text-align: center;">(Accepts + Valid)</div> </div>
Approval Rate	$= \frac{\boxed{38}}{\boxed{38}} = \boxed{100.0\%} \geq 90\%$

A&R	<input checked="" type="checkbox"/>	Not approved
		Reason:

VII. Safety Check

See § 14 of the Regulations for further information

Motion:	<input checked="" type="checkbox"/>	This is not a Safety Document: when all safety-related information is removed, the document is still technically sound and complete.
	<input type="checkbox"/>	This is a Safety Document: when all safety-related information is removed, the document is not technically sound and complete.
	<input type="checkbox"/>	Safety Checklist (Regulations ¶ 14.3) is complete and has been included with the document throughout the balloting process.
Motion by/2 nd by		Noel Poduje (SMS) / Fritz Passek (Siltronic)
Discussion		None
Vote		14-0 Motion passed
A&R	<input checked="" type="checkbox"/>	Not approved
		Reason:

VIII. Intellectual Property Check

Note: This ballot may be all or part of a Standard or Safety Guideline. This IP check applies to the entire Standard or Safety Guideline. See § 15 of the Regulations for further information

x	The meeting chair asked those present in person or by electronic link, if they were aware of any potentially material patented technology or copyrighted items* in the Standard or Guideline.		
	<input checked="" type="checkbox"/>	No potentially material patented technology or copyrighted items are known	GO TO SECTION IX
	<input type="checkbox"/>	Potentially material patented technology or copyrighted items are known but a Letter of Assurance (LOA) or copyright release for such material has been obtained or presented to the committee.	GO TO SECTION IX
	<input type="checkbox"/>	Potentially material patented technology or copyrighted items are known but an LOA or copyright release for some of the material(s) has NOT been obtained or presented to the committee	
	MOTION	<input type="checkbox"/>	Ask ISC for special permission to publish
		<input type="checkbox"/>	Quit activity
		<input type="checkbox"/>	Wait for LOA for patented technology or release of copyrighted items.
	Motion by/2 nd by		Name (Company)/Name (Company)
	Discussion		XXXX
	Vote		XX-XX
Final Action		<input type="checkbox"/> Motion Passed	
		<input type="checkbox"/> Motion Failed	
A&R	<input checked="" type="checkbox"/>	Not approved	

	Reason:
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* Note: Such potentially material patented technology or copyrighted items might have become known since the Standard or Safety Guideline was last reviewed, or might become relevant due to this ballot.

IX. Action for this document

Motion	<input type="checkbox"/>	This document passed committee review as balloted and will be forwarded to the A&R for procedural review.	
	<input checked="" type="checkbox"/>	This document passed committee review with editorial changes and will be forwarded to the A&R for procedural review.	
	<input type="checkbox"/>	This document failed committee review and will be returned to the task force for rework.	
	<input type="checkbox"/>	This document failed committee review and work will be discontinued.	
Motion by/2nd by		Noel Poduje (SMS)/ Fritz Passek (Siltronic)	
Discussion		None	
Vote		14-0	
Final Action	<input checked="" type="checkbox"/>	Motion passed	
	<input type="checkbox"/>	Motion failed	
A&R	<input checked="" type="checkbox"/>	Approved	
	<input type="checkbox"/>	Not approved	
		Reason:	