## **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	Revision of SEMI M40-1109 With Title Change To:
5707	Guide for Measurement of Roughness of Planar
	Surfaces on Polished Wafers

## 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
ACCIT	Re	ason:

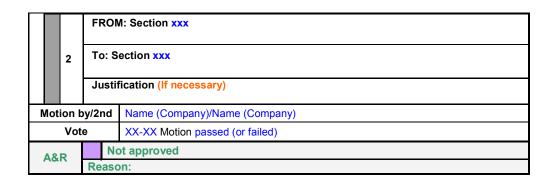
III. Rejects
There was no reject received for ballot 5707.

## **IV. Comments**

## Comment 1

$\tilde{-}$	1		1			
	Referenced Section			*TF/Committee to fill in if necessary		
1		Fi	om	Thomas Germer, NIST		
Comment		Con	nment	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.		
	х	Th	e commit	tee agreed to do one of the following actions.		
	X	*No	motion	is required in this step.		
			No furth	er action was taken by the committee.		
			Refer to the task force for more consideration.			
			New Bus	siness		
		Х	Other			
Action proposed	Editorial Change					
гoр			Case 1:	No vote in this section :		
osed		Х	To be in	cluded and voted on in § 5. Summary of Editorial Changes.		
			Case 2:	Voted in this section :		
			Original "TO" fie	section number and at least one full sentence are required in "FROM" and elds.		
			FROM:	Section xxx		
		1	To: Sec	tion xxx		
			Justific	ation (If necessary)		

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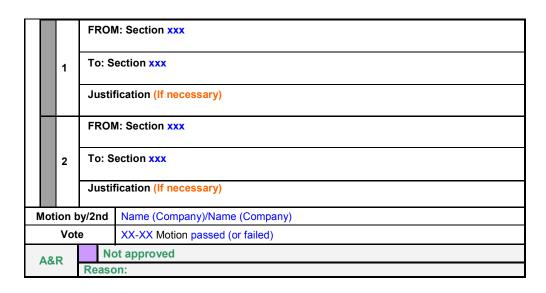
### Comment 2

	ı		enced ction	*TF/Committee to fill in if necessary		
		Fr	om	Peter Wagner, PWC		
Comment	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 ascut, etched, lapped or ground surfaces. This change should be re-considered.		
	ı	Disc	ussion	Comment is appreciated. No change is required.		
	X	The	e commit	tee agreed to do one of the following actions.		
	^	*No		is required in this step.		
		х		er action was taken by the committee.		
				the task force for more consideration.		
			New Bu	siness		
			Other			
Action proposed	Editorial Change					
ğ			Case 1:	No vote in this section :		
			To be in	cluded 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 elds.		
		1	FROM:	Section xxx		

	To: S	ection xxx				
	Justification (If necessary)					
	FROM: Section xxx					
2	To: Section xxx					
	Justi	fication (If necessary)				
Motion I	by/2nd	Name (Company)/Name (Company)				
Vot	te	XX-XX Motion passed (or failed)				
A&R	No	ot approved				
Adil	Reason:					

## Comment 3

	Referenced Section			*TF/Committee to fill in if necessary				
Ö		Fr	om	Peter Wagner, PWC				
Comment	Comment  Discussion			Accept with comment  2. End of 7.3.4: remove "(Stover)" and add an upper index "6" for the footnote.  Editorial change is needed.				
		The	e commit	tee agreed to do one of the following actions.				
	X	*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					
		х	Other					
Action proposed	Editorial Change							
			Case 1:	No vote in this section :				
		Х	To be included and voted on in § 5. Summary of Editorial Changes.					
1			Case 2:	Voted in this section :				
			Origina "TO" fie	section number and at least one full sentence are required in "FROM" and elds.				



### Comment 4

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

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: 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 Comment 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  $\mu \text{m}.$ Formatting error. Corrections are proposed in the Summary of Editorial Changes Discussion section below. 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** Other Action proposed **Editorial Change** 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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	FRC	FROM: Section xxx					
1	To:	To: Section xxx					
	Just	Justification (If necessary)					
	FRC	OM: Section xxx					
2	То:	To: Section xxx					
	Just	ification (If necessary)					
Motion	by/2nd	Name (Company)/Name (Company)					
Vo	te	XX-XX Motion passed (or failed)					
A&R	N	ot approved					
Adit	Reason:						

## V. Summary of Editorial Changes

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

#### TO: After Section 2.6, add these two notes

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.

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.

#### Justification

Notes added for clarification. No technical change is introduced. Addition of notes is editorial changes.

#### FROM: Section 7.3.4

Also, the slope of the PSD curve can be important in certain situations (Stover).

#### TO: Section 7.3.4

Also, the slope of the PSD curve can be important in certain situations (Stover).

#### Justification:

Editorial correction. Footnote 6 is already appear at the bottom of the page in the ballot that read

<sup>6</sup>Stover, J. C, Optical Scattering, Measurement and Analysis, Second Edition, (SPIE Optical Engineering Press, Bellingham, WA. 1995), p. 79.

## 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

7.5.3 7.5.4 Such tools may be able to access a spatial bandwidth range of about one-half the wavelength of

# VI. Approval Conditions Check

15-0 Motion passed
Not approved

the illuminating light up to several hundred µm.

Add missing section number for 7.5.1

Kurt Haller (KLA-Tencor)/Masami Ikota (Hitachi High Tech)

To approve the above editorial changes

3

Justification:

Motion

Motion

by/2nd by Discussion

Vote

A&R

Formatting error.

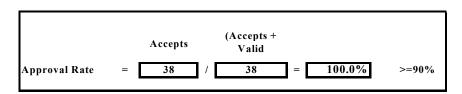
None

Reason:

**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.



A&R		Not approved
Adit	Re	ason:

VII. Safety Check
See § 14 of the Regulations for further information

×	x		This is not a Safety Document: when all safety-related information is removed, the document is still technically sound and complete.					
lotion			This is a Safety Document: when all safety-related information is removed, the document is not technically sound and complete.					
		ecklist (Regulations ¶ 14.3) is complete and has been included with the document the balloting process.						
N	/loti	on k	y/2r	nd by	Noel Poduje (SMS) / Fritz Passek (Siltronic)			
	D	iscı	ıssi	on	None			
	Vote				14-0 Motion passed			
	A&F	,		Not a	pproved			
	AOIN		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

	The resulting shaded or Safety Guideline. See § 15 of the Regulations for further information									
х		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.								
	х		otentially n	GO TO SECTION IX						
		Pote know such	GO TO SECTION IX							
		сору	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							
	M		Ask ISC f	or spec	or special permission to publish					
	MOTION		Quit activ	ity						
	ž		Wait for L	OA for	patented technology or release of copyrighted	d items.				
	Мо	tion b	y/2 <sup>nd</sup> by	Name (Company)/Name (Company)						
		Discus	sion	XXXX						
		Vot	e	XX-XX						
	_	inal A	otion	Motion Passed						
		Final Action			Motion Failed					
A	&R		Not appro	ved						

Reason:

## IX. Action for this document

		This document passed committee review as balloted and will be forwarded to the A&R for procedural review.					
Motion	x	This document passed committee review with editorial changes and will be forwarded to the A&R for procedural review.					
		This document failed committee review and will be returned to the task force for rework.					
		This document failed committee review and work will be discontinued.					
Motion by/2n by			y/2nd	d	Noel Poduje (SMS)/ Fritz Passek (Siltronic)		
	Dis	cus	cussion		None		
Vot			ote		14-0		
	Fina	al Action		X	Motion passed		
	1 1116				Motion failed		
	A&R			Ap	pproved ot approved		
		2		No			
	Reason:		n:				

<sup>\*</sup> 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.