

SEMI China HB-LED Std. Technical Committee Sapphire Single Crystal Ingot Task Force



AURORA
Apr. 20th 2017

Leaders of Sapphire Single Crystal Ingot Task Force

No.	Name	Company	Industry Chain
1	Zuo Hongbo	AURORA	Sapphire Manufacturing

Note: Industry Chain: Sapphire Manufacturing/ Epitaxial & Chip/ Package & Module/ Applications/ Processing Equipment/ Processing Materials/ Others

Members of Sapphire Single Crystal Ingot Task Force

No.	Name	Company	Industry Chain
1	Yang Xinhong	AURORA	Sapphire Manufacturing
2	Zhang Xuejun	AURORA	Sapphire Manufacturing
3	Ding Guangbo	AURORA	Sapphire Manufacturing
4	Ji Yong	GHTOT	Sapphire Manufacturing
5	Qi Liuyun	GHTOT	Sapphire Manufacturing
6	Ren Jing	GHTOT	Sapphire Manufacturing
7	Chen Kunyou	GHTOT	Sapphire Manufacturing
8	GAN Yang	HIT	Others
9	Shen Jian	HIT	Others

Note1: Industry Chain: Sapphire Manufacturing/ Epitaxial & Chip/ Package & Module/ Applications/ Processing Equipment/ Processing Materials/ Others

Note2: New members joined in TF showed in different background colors

Members of Sapphire Single Crystal Ingot Task Force

No.	Name	Company	Industry Chain
10	Zhang Huixuan	ECEC	Sapphire Manufacturing
11	Li Qingyue	ECEC	Sapphire Manufacturing
12	Zhen Wei	Dan Dong Xin Dong Fang	Processing Equipment
13	Shi feng	Dan Dong Xin Dong Fang	Processing Equipment
14	Zhao Songbin	Dan Dong Xin Dong Fang	Processing Equipment
15	Zhao Jingting	Beslord	Sapphire Manufacturing
16	Wu Longqiang	Crystaland	Sapphire Manufacturing
17	Sui Honglin	CETC48	Others
18	Lv Wenli	CETC48	Others

Note1: Industry Chain: Sapphire Manufacturing/ Epitaxial & Chip/ Package & Module/ Applications/ Processing Equipment/ Processing Materials/ Others

Note2: New members joined in TF showed in different background colors

Documents in Work

SEMI Draft Document 5775B

Doc. Name :

Specification for Sapphire Single Crystal Ingot Intended for Use for Manufacturing HB-LED Wafers

高亮度LED衬底用单晶蓝宝石晶棒规范

Content:

1. The document specify requirement of Diameter, Reference plane width, End face orientation, Reference plane orientation, Roundness, Straightness, Verticality, total 7 types properties related to LED quality.
2. The document specify requirement of Bubbles and Cloud, Crack, Chips, Surface Scratch , total 5 defects related to LED quality.

更多标准详细内容将在申请全球投票环节汇报/ **More details will be presented in Ballots Request slot later**

Documents in Work

SEMI Draft Document 5775B

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5775 - Std-HB-LED

5775 - Std-HB-LED New Standard: Specification for Sapphire Single Crystal Ingot Intended for Use for Manufacturing HB-LED Wafers

AcceptComments **AFF_ITSDI** **290498 - Vargas-Bernal, Rafael**
n subsection 6.1.3.1 separate '2theta' into two words. Separate units and quantities of subsections 6.1.3.2, 6.1.4, 6.1.5, 6.2.1, 6.2.2, 6.2.3, 7.6, 7.8, 7.9, 7.11, y7.12.

Reject **AFF_PWC** **48158 - Wagner, Peter**
(Comments on 5775.pdf)

Reject **AFF_BayTech-Resor** **300120 - Moore, Chris**
This standard overlaps with 5723 and should be edited such that there is no overlap. This could be done by modifying 5723 to not apply to ingots.

Reject **AFF_BayTech-Resor** **432614 - Baylies, Winthrop**
The 'set' of tests for Sapphire material differs from tests for Ingot Material. This difference must be resolved.

AcceptComments **AFF_Scientific Visual SA** **433134 - Watts, Michael**
Attached file for defect classification specification.
Also minor change in English..
From: In one word, classified and selected the most suitable and economical specification of sapphire ingot for LED application.
To: The objective is to classify and select the most suitable and economical sapphire ingots for LED applications.
(Proposal for Sapphire Single Crystal Ingot TF_ sent to TF_.pdf)

Total Voting Interests/Votes: 59/72 **Voting Interest Accepts: 26 (92.86%)** **Voting Interest Rejects: 2**

Voting Interest Returns: 44 **Return Percentage: 61.97%** **Voting Interest Distribution: 71**

Documents in Work

SEMI Draft Document 5775B

5775#.

Question 1: Do you mean that we need complete our scope? I wonder if it is OK to change the scope to "This specification includes the test methods and the requirements of key parameters and the defects of sapphire single crystal ingots"? *[Peter Wagner]* Yes

Question 2 and 3: Could you please point out which standard should be removed? *[Peter Wagner]* Any standards that are not referenced in the text of the document and any standards that do not refer to sapphire or sapphire test methods.

Question 4: We consider that the customers and manufacturers can't get a consistent test results if there is no limitation on test method. For example, if we stipulate measurement tools only instead of confine diameter test method in detail, one can measure diameter in one position only which may have no representation. This absence will lead to disputation between customer and manufacture. Therefore, we think the content about test method is necessary. In view of your advices, I wonder if it is OK to separate test method as an attachment of this specification. *[Peter Wagner]* It would preferable to have the test methods as separate documents. If they are included in the specifications then they have to follow SEMI's rules for test methods standards. Although it is preferable to have standardized test methods, it is not always necessary. You always can say "to be agreed by customer and supplier" regarding how to test a specified parameter.

Question 5: The definition about bubbles and clouds in 5723# is mainly described about the inspection tool and grade classifications, while it mainly gives a demand on the quantity of bubbles and clouds in sapphire ingot in 5775#. *[Peter Wagner]* I do not agree. What you probably want to say is that the length of the ingot that contains bubbles and clouds should be less than 10 % of the total ingot length, but what is the total ingot length and what means no bubbles? Probably meaning only bubbles with a diameter below detection limit, which needs to be defined.

Question 6: We will add the table format for order entry. Because it is the first time to do this specification, it is kind of you to offer us a table format sample for order entry if possible. Thanks alot. *[Peter Wagner]* Please see SEMI M1 or SEMI HB1.

Sincerely hope for your reply!

Documents in Work

SEMI Draft Document 5775B

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5775A - Std-HB-LED

5775A - Std-HB-LED New Standard: Specification for Sapphire Single Crystal Ingot Intended for Use for Manufacturing HB-LED Wafers

Reject

AFF_PWC

48158 - Wagner, Peter

(Comments on 5775A.pdf)

Total Voting Interests/Votes: 60/78

Voting Interest Accepts: 27 (96.43%)

Voting Interest Rejects: 1

Voting Interest Returns: 46

Return Percentage: 63.01%

Voting Interest Distribution: 73

Documents in Work

SEMI Draft Document 5775B

- 4.2.2: what you probably want to say is: "The difference of the maximum and minimum distances between two thought lines that are generated by the intersection of plane containing the axis of the ingot with the cylindrical surface." However, a definition of the term "ingot axis" is missing.

- in section 5 now measurement equipment is mentioned with which the specifications are to be verified or checked, but mentioning a measurement equipment is not equivalent with a test method. I recommend to remove the references to measurement equipment and to add "as mutually agreed by customer and supplier". Adding a table to section 5 with all required ordering information would be helpful. Please check e.g. SEMI M1 for how it should be done.

- 6.2: again a table listing all the different combinations of wafer diameters and reference plane heights would be preferable.

- 6.3 and 6.5: accuracy is not the correct term here. What you mean is tolerance.

- 6.6: the spatial wavelength range for this specification is still missing.

- 6.7: what you probably want to say, I assume, is: "The angle between the ingot end surface (face would be more correct) and the reference plane shall be $90^\circ \pm 0.1^\circ$." and "The angle between the ingot end surface and the ingot body (whatever this means. Or do you mean ingot axis?) shall be $90^\circ \pm 0.2^\circ$."

- 6.8: again, what you probably want to say is: "The diameter of a of a 2 inch ingot (do you really mean 2 inch or 5 cm? SEMI standards are obliged to use SI units!) shall be 50 mm \pm 0.03 mm and the diameter of a 4 inch ingot shall be 100 \pm 0.04 mm."

- 6.9: Again, it would be better to say: "The straightness of a 2 inch sapphire ingot shall be 0 \pm /-

Documents in Work

SEMI Draft Document 5775B

Dear

thank you for your message. This version of doc 5775B is much better, but there are still a lot of issues.

I'd be glad to help and I gave you already a lot of advice but additionally improving this document is time consuming and is beyond my obligations as a member of the HB-LED Technical Committee. I'd be glad to improve the document but somebody, I ask for your understanding, would have to pay for my time. You are paid by your company but I am a freelancing consultant and I have to find some financial support for being able to be active in the HB-LED Technical Committee.

I'd be also glad to send you a proposal and quotation for my services.

Best regards and asking for your understanding again

Peter Wagner

Best regards

Documents in Work

SEMI Draft Document 5775B

To: co-chairs of the China TC Chapter and GCS of the HB-LED global technical committee
From: Larry Hartsough, Chair, ISC A&R SC
Date: December 8, 2016

Subject: Document 5775A failed procedural review.

Reason:

SEMI Draft Document 5775A(**New Standard: Specification for Sapphire Single Crystal Ingot Intended for Use for Manufacturing HB-LED Wafers**) failed procedural review. Substantive and technical changes cannot be made as an editorial change. See Regulations 8.9.5 and Procedure Manual 2.11.4 and Table 6.

The following table lists editorial changes that were not procedurally correct and the reason for this finding. Some A&R members also consider other editorial changes to be technical. Such changes could have also been cited as reasons to fail the document.

Change #	Change made	Reason for Fail
VI-1	Delete Appendices 1-6	Deletion of Appendices cannot be made by an editorial change.
VI-4	Delete Section 5, Test Methods	Deletes requirements (by reference to the Appendices)

Corrective Action:

Task Force should incorporate all of their desired changes, including those made during the review of Doc 5775A into a new Draft Doc 5775B and issue another Letter Ballot.

Progress on the Documents

Content	When
Authorized new standard/标准立项	Sep.2014
Collect information, analysis and identify/数据收集,数据分析/验证/论证	Oct.2014~Mar.2015
Finish standard draft/制定标准草案	Mar.2014~Jun.2015
To discuss the standard draft, voting in the group /进行标准草案稿讨论，组内投票	Jun.2015
Modify the standard draft/草案修订	Jun.2015~Aug.2015
Submit to SEMI Standards committee for review/提交核心委员审核	Sep.2015
Global Ballot/全球投票	Oct.2015~Nov.2015
Modify the standard with the suggestions of the global vote/参照全球投票建议对标准文件进行修改	Dec.2015~Mar.2016
Submit to SEMI Standards committee for review/提交核心委员审核	Apr.2016
Global Ballot/全球投票	Jun.2016
Modify the standard with the suggestions of the global vote/参照全球投票建议对标准文件进行修改	Jul.2016~Sep.2016
Submit to SEMI Standards committee for review/提交核心委员审核	Oct.2016

TF Work Plan for the Next Step

Content	When
Request for A&R Audit Review Subcommittee/申请审查委员会评审	Oct.2016
Failed procedural review/程序审查失败	Dec.2016
Modify the standard draft/草案修订	Jun.2017~Mar.2017
Submit to SEMI Standards committee for review/提交核心委员审核	Apr.2017
Request for Ballots in Cycle 5-2017/申请第5轮全球投票	May.2017

THANK YOU