



The 41st Annual NANO Testing Symposium



Virtual-only Conference

25-27 October 2021

<http://www-NANOTS.ist.osaka-u.ac.jp/>
NANOTS@ist.osaka-u.ac.jp

Sponsored by The Institute of NANO Testing
In cooperation with

- The Institute of Electronics, Information and Communication Engineers
- The Japan Society of Applied Physics
- Reliability Engineering Association of Japan
- Union of Japanese Scientists and Engineers

Contents

1. Location	1
2. Special Invited Talk	1
3. Invited Talk	1
4. Tutorial Session	1
5. Panel Discussion	2
6. Authors Corner	2
7. Evening Session	2
8. Exhibition and Commercial Session	2
9. Official Languages	3
10. Registration Fee	3
11. Symposium Registration	3
12. Cancellation Policy	4
13. Proceedings	4
14. Questionnaire for Ex-post Evaluation	4
15. Latest Information	4
16. Steering & Program Committee	5
17. Secretariat	5
18. Technical Program	5
Monday, Oct. 25, a.m. / Virtual	5
Monday, Oct. 25, p.m. / Virtual	6
Tuesday, Oct. 26, a.m. / Virtual	8
Tuesday, Oct. 26, p.m. / Virtual	9
Wednesday, Oct. 27, a.m. / Virtual	10
Wednesday, Oct. 27, p.m. / Virtual	11
19. Author Index	13
20. Exhibition	14
21. List of Associate Members	16



The event platform will be used for conference video streaming, Q&As and virtual exhibition (product introduction, message exchange, online business meeting, etc.).

1 Location

Technical Sessions:

Virtual-only

Exhibition:

Virtual-only

Evening Session:

Virtual-only

2 Special Invited Talk

The following special invited talk will be given.

18:00–19:00, Tuesday, 26 October:

“TEZUKA2020 and how AI technologies were used in it”
by Dr. Ryohei Orihara, KIOXIA Corp.

3 Invited Talk

The following invited talks will be given.

9:30–10:30, Monday, 25 October:

“Advancement of optical measurement techniques using versatile control of optical waves with optical frequency combs”

by Prof. Kaoru MINOSHIMA, *Grad. Sch. Informatics and Engineering, Univ. Electro-Communications*

13:00–14:00, Monday, 25 October:

“Semiconductor strategy to enhance international competitiveness”

by Dr. Toyooki MITSUI, *JEITA Semiconductor Steering Committee & Chairperson*

15:20–16:20, Tuesday, 26 October:

“Next-generation computing system based on electromagnetic near field design and advanced assembly technology”

by Prof. Noriyuki MIURA, *Grad. Sch. Information Science and Technology, Osaka Univ.*

4 Tutorial Session

The following tutorial sessions will be given.

14:10–15:10, Monday, 25 October:

“Basics of power semiconductor devices and their characteristics (structure, application, reliability)”

9:30–10:30, Tuesday, 26 October:

“Physical analyses of semiconductor devices using charged particle beam instruments”

by Akinari MORIKAWA, *Hitachi High-Tech Corp.*

5 Panel Discussion

A panel discussion on “Characteristics of outsourced analysis –Strengths–” will be held on Wednesday, 27 October 16:30–17:30.

6 Authors Corner

Authors corner, a place for audience to meet with and discuss with authors, will be given just after the sessions (except for commercial sessions) in Zoom meetings.

7 Evening Session

Evening session I:

for discussing on research trend around the world and the future perspective.

Evening session II:

Special Invited Talk by Dr. R. Orihara.

The session will be held on the Tuesday, 26 October 16:30–19:00 in a virtual space (Zoom meeting, Gather.town, etc.).

8 Exhibition and Commercial Session

The Symposium will feature the latest in service providers, equipment manufacturers and suppliers. A virtual exhibition booth will give the opportunity to key-vendors to represent the core business area in these fields. Furthermore, a commercial session will give the opportunity to introduce new products with short presentation.

9 Official Languages

The official languages of the symposium are Japanese and English. Papers included in the proceeding will be written in Japanese or English. Papers in Japanese will have an abstract written in English. We will have no interpreter.

10 Registration Fee

Course	Fee	Including
Non-student	JPY 10000	All sessions, exhibition, and proceeding (download only)
Student	JPY 5000	

Please pay the fee by 15 October 2021 in one of the following ways. The archived presentations (permitted only) are available to all attendees for two weeks after the conference.

Wire Transfer: Please send Japanese YEN (JPY) to the following account by wire transfer:

Bank Name: Resona Bank, Ltd.

SWIFT (BIC) Code: DIWAJPJT

Branch Name: Senri-Kita Branch

Branch Code: 222

Address: 4-2-D2-201, Furuedai, Suita, Osaka, 565-0874, Japan

Phone: +81-6-6872-0651

Account Number: 6843152

Account Name: The Institute of NANO Testing
Nakamae Koji

Note: All bank charges JPY 5,000 (= the sending bank charge + the receiving bank charge) must be paid by the participant.

Credit card: Please click “Pay Now” button after you finish on-line registration.

11 Symposium Registration

Please register on line by using our website: <http://www-NANOTS.ist.osaka-u.ac.jp/> by 15 October 2021 (punctuality).

12 Cancellation Policy

Cancellations must be submitted in an e-mail. Cancellations received by 17:00, 15 October 2021 (in Japan Standard Time) are entitled to a refund minus an administrative fee (all bank charges plus a 10 % processing fee). No refunds will be given to registrants who cancel after 15 October 2021 or who fail to attend the event.

13 Proceedings

The conference program and technical papers will be provided on electronic media (download). Download information of the proceedings will be announced on October 21, 2021.

14 Questionnaire for Ex-post Evaluation

A questionnaire about NANOTS2021 conference will be conducted from October 28 to November 10, 2021. The questionnaire includes the evaluation of each presentation at Special Invited talk, invited talk, tutorial, panel session, technical and commercial sessions. From the evaluation results, the Best Interested Paper, Young Researcher Award (with age limit) and Best Commercial Session Presenter (new award from 2021) will be determined. The archived presentations will be available during only the period. We would like to thank all of you for your cooperation.

15 Latest Information

You can find latest information on all aspects of NANOTS at <http://www-NANOTS.ist.osaka-u.ac.jp/>.

16 Steering & Program Committee

Chairman:

Koji NAKAMAE	(Osaka University)
Member:	
Yasuo CHO	(Tohoku University)
Yasunori GOTO	(MIRISE Technologies)
Yasuhide HIGUCHI	(Hitachi, Ltd.)
Toru KOYAMA	(Fuji Electric Co., Ltd.)
Suigen KYOH	(Kioxia Corp.)
Hitoshi MAEDA	(Renesas Electronics Corp.)
Kiyoshi NIKAWA	(Device Evaluation Technology Lab.)
Yoichi OSE	(Hitachi High-Tech Corp.)
Hirotoshi TERADA	(Hamamatsu Photonics)
Masahiko TSUJITA	(Sony Semiconductor Manufacturing Corp.)
Yuichiro YAMAZAKI	(TASMIT Inc.)

17 Secretariat

Yoshihiro MIDOH and Koji NAKAMAE
Secretariat of the Institute of NANO Testing
Miura Lab., Dept. Information Systems Engineering,
Grad. Sch. Information Science and Technology
Osaka University
1-5, Yamada-Oka, Suita, Osaka, 565-0871 JAPAN
Phone/Fax: +81-6-6879-7813 / +81-6-6879-7812
E-mail: NANOTS@ist.osaka-u.ac.jp
Web: <http://www-NANOTS.ist.osaka-u.ac.jp/>

18 Technical Program

Monday, Oct. 25, a.m. / Virtual

- (1) **Opening remarks**
9:20 K. Nakamae / Chairman, The Institute of NANO Testing

Invited Talk I

a.m., Mon 25

Chairman Suigen Kyoh

- (I1) **Advancement of optical measurement techniques using versatile control of optical waves with optical frequency combs**
9:30 K. Minoshima / Grad. Sch. Informatics and Engineering, Univ. Electro-Communications
..... 10:30~10:40 Authors corner & break

Metrology and Inspection

a.m., Mon 25

Chairman Yuichiro Yamazaki

- (2) **Measurability analysis of the HAR structure in 3D memory by T-SAXS simulation**
10:40 K. Sasaki, T. Hashimoto, Y. Kuo, H. Tsukada, and H. Tanizaki / Institute of Memory Technology Research & Development, Kioxia Corp.
(3) **Advanced high throughput e-beam inspection with DirectScan**
11:05 M. Strojwas^(a), M. Miyoshi^(c), I. De^(b), and M. Keleher^(c) / DFM Solutions, PDF Solutions, Inc., ^{b)}VCI E-beam R&D, PDF Solutions, Inc., ^{c)}Technical Account Management, PDF Solutions, Inc.
..... 11:30~11:50 Authors corner & break
- 11:50~13:00 Lunch Break

Monday, Oct. 25, p.m. / Virtual

Invited Talk II

p.m., Mon 25

Chairman Suigen Kyoh

- (I2) **Semiconductor strategy to enhance international competitiveness**
13:00 T. Mitsui / JEITA Semiconductor Steering Committee & Chairperson
..... 14:00~14:10 Authors corner & break

Tutorial I

p.m., Mon 25

Chairman Koji Nakamae

- (T1) **Basics of power semiconductor devices and their characteristics (structure, application, reliability)**
14:10 K. Endo / Advanced Power Electronics Research Center, National Institute of Advanced Industrial Science and Technology
..... 15:10~15:20 Authors corner & break

Power Device Analysis

p.m., Mon 25

Chairman Toru Koyama

- (4) **Carrier lifetime characterization in SiC devices by a microscopic free carrier absorption method**
15:20 M. Kato^(a), T. Fukui^(a), and T. Tawara^{(b) / (a)} / Grad. Sch. Engineering, Nagoya Institute of Technology, ^{b)}National Institute of Advanced Industrial Science and Technology
(5) **Visualization of nanoscale carrier dynamics at SiO₂/SiC interfaces by time-resolved scanning nonlinear dielectric microscopy**
15:45 K. Yamasue and Y. Cho / Research Institute of Electrical Communication, Tohoku Univ.
..... 16:10~16:30 Authors corner & break

Commercial Session

p.m., Mon 25

Chairman Hitoshi Maeda

- (C1) **New inspection method for Si crystal defects by photoluminescence**
16:30 T. Kida / Marketing, Semilab Japan
(C2) **Layout and schematic analysis in HAMAMATSU interface suite**
16:38 M. Nikaido, T. Takahashi, Y. Sawamura, and K. Hirai / EDA Product Div., TOOL Corp.
(C3) **Introduction of nano prober service for advanced process products**
16:46 K. Inomata, H. Kawahara, and H. Tsukui / Evaluation Analysis Dept., Renesas Engineering Services Co., Ltd.
(C4) **Evolved micro probing system**
16:54 Y. Nakashima^(a), J. Sukegawa^(a), and C. Rob^{(b) / (a)} / Sales I Div., TOKI COMMERCIAL Co., LTD, ^{b)}Sales Div., Imina Technologies SA

(C5) Ultra-thin film evaluation combining planar
17:02 STEM observation and surface analysis
technologies

T. Hirano, S. Matsuo, and N. Okano / Applied Physics
Engineering Dept., Material Solution Div., Technical Div.,
KOBELCO research institute, Inc.

(C6) Introduction of the new CAD navigation system
17:10 "AZSA" for failure analysis
K. Konishi / Sales Gr, Astron. Inc.

(C7) FIB-SEM extensions for failure analysis: rapid
17:18 processing with fs-laser and ToF-SIMS analysis
E. Maeda and A. Sato / Research Microscopy Solutions,
Carl Zeiss Co., Ltd.

(C8) Electrical probing solutions and applications for
17:26 micro and nanoscale device characterization
R. Claassen^(b) and Y. Nakayama^(a) / a) APOLLOWAVE
Corp., ^{b)}Sales Dept., Imina Technologies SA

Tuesday, Oct. 26, a.m. / Virtual

Tutorial II a.m., Tue 26
Chairman Yoichi Ose

(T2) Physical analyses of semiconductor devices
9:30 using charged particle beam instruments
A. Morikawa^(a) and T. Sato^(b) / a) Analysis System
Solution Development Dept., Hitachi High-Tech Corp.,
^{b)}Semiconductor Analysis Systems Solution Development
Dept., Hitachi High-Tech Corp.

..... 10:30~10:40 Authors corner & break

Electron Optics & Application a.m., Tue 26
Chairman Yuichiro Yamazaki

(6) Development of tilt observation technique for
10:40 defect evaluation SEM "CT1000"
T. Hattori^(a), M. Ieda^(a), N. Okai^(b), and N. Suzuki^{(a) /}
^{a)}Electron Beam Systems Design Dept., Hitachi
High-Tech Corp., ^{b)}Research&Development Group,
Hitachi Ltd.

(7) Noise reduction in phase reconstruction of
11:05 electron holograms using an aperture shape
optimization by Fourier ring correlation
T. Okada, Y. Midoh, K. Nakamae, and N. Miura / Grad.
Sch. Information Science and Technology, Osaka Univ.

..... 11:30~11:50 Authors corner & break

..... 11:50~13:00 Lunch Break

Tuesday, Oct. 26, p.m. / Virtual

Fault Localization I p.m., Tue 26

Chairman Hirotoshi Terada

(8) In-line schematic failure analysis technique with
13:00 fewer frame defect SEM images

J. Okude, C. Ida, K. Nojima, and A. Hamaguchi / The
Advanced Memory Development Center, KIOXIA Corp.

(9) High throughput copper removal of frontside
13:25 circuit edit

H. Tanaka^(a), M. Wong^(b), D. Pan^(b), S. Kunihiro^(c), and
M. Sato^(c) / a) FEI Company Japan Ltd., ^{b)}Analytical
Instruments Materials and Structural Analysis, Thermo
Fisher Scientific, ^{c)}DENKEN Co. Ltd.

..... 13:50~14:10 Authors corner & break

Fault Localization II p.m., Tue 26

Chairman Kiyoshi Nikawa

(10) Evaluation of characteristic changes of high
14:10 voltage transistor by electron beam irradiation
A. Hisasue, T. Ukai, H. Maeda, and K. Arima /
Analysis & Evaluation Technology Dept. Device
Technology Div. Production and Technology Unit,
Renesas Electric Corp.

(11) An approach to enhance the resolution of fault
14:35 diagnosis using both scan and IDQ data
S. Honbu, S. Nomura, S. Wada, N. Matsui,
H. Yamamoto, and T. Okubo / Evaluation Analysis
Dept., Renesas Engineering Services

..... 15:00~15:20 Authors corner & break

Invited Talk III p.m., Tue 26

Chairman Koji Nakamae

(13) Next-generation computing system based on
15:20 electromagnetic near field design and
advanced assembly technology

N. Miura^{(a),(b) / a)}Grad. Sch. Information Science and
Technology, Osaka Univ., ^{b)}JST PRESTO

..... 16:20~16:30 Authors corner & break

Evening Session I

p.m., Tue 26

16:30 Evening session of NANOTS is a special session for
18:00 discussing on research trend around the world and the
future perspective.

Location:

Virtual

Program:

- NANOTS2020 Awards

Evening Session II Special Invited Talk

p.m., Tue 26

Chairman Suigen Kyoh

(S1) TEZUKA2020 and how AI technologies were
18:00 used in it

R. Orihara / KIOXIA Corp.

..... 19:00 Close

Wednesday, Oct. 27, a.m. / Virtual

Machine Learning for Process Control

a.m., Wed 27

Chairman Toru Koyama

(12) A data-driven method for finding physical laws
9:30 using neural networks with polynomial
constraints

T. Takemoto, Y. Midoh, K. Nakamae, and N. Miura /
Grad. Sch. Information Science and Technology, Osaka
Univ.

(13) A deep generative model of the SEM image
9:55 using a small simulation dataset

Y. Midoh, K. Iwamoto, K. Nakamae, and N. Miura /
Grad. Sch. Information Science and Technology, Osaka
Univ.

..... 10:20~10:40 Authors corner & break

Fault Localization III/Physical Analysis I

a.m., Wed 27

Chairman Kiyoshi Nikawa

- (14) Effectiveness of failure analysis by laser stimulation in visible light region
10:40

T. Matsumoto^(a) and K. Koshikawa^{(b) / (a)} Systems Technology, Systems Div., Hamamatsu Photonics K. K.,
^{b)}Dept. 18, Systems Div., Hamamatsu Photonics K. K.

- (15) Heat transfer simulations of nanoporous materials with two-dimensionally arranged pores
11:05

Y. Takagishi, K. Koga, and T. Yamaue / Computational Science Center, Kobelco Research Institute Inc.

..... 11:30~11:50 Authors corner & break

..... 11:50~13:00 Lunch Break

Wednesday, Oct. 27, p.m. / Virtual

Physical Analysis II

p.m., Wed 27

Chairman Yasuhisa Higuchi

- (16) Nanoscale study of interface defect density evaluation at diamond MOS interfaces using time-resolved scanning nonlinear dielectric microscopy
13:00

Y. Ogata^(a), K. Yamasue^(a), X. Zhang^(b), T. Matsumoto^(b), N. Tokuda^(b), and Y. Cho^{(a) / (a)} Research Institute of Electrical Communication, Tohoku Univ.,
^{b)}NanoMaterials Research Institute, Kanazawa Univ.

- (17) Measurement of local capacitance-voltage characteristics on high-k/SiO₂/Si under DC bias stress using time-resolved scanning nonlinear dielectric microscopy
13:25

K. Suzuki, K. Yamasue, and Y. Cho / Research Institute of Electrical Communication, Tohoku Univ.

..... 13:50~14:10 Authors corner & break

Physical Analysis III

p.m., Wed 27

Chairman Yoichi Ose

- (18) Visualization of work function differences and band gaps by spectrum imaging using AES
14:10

K. Ikita^(a), T. Uchida^(a), K. Yokouchi^(a), A. Tanaka^(a), K. Tsutsumi^(a), N. Ikeo^(b), and N. Taguchi^{(b) / (a)} SA Business Unit, JEOL Ltd., ^{b)}Research Institute of Electrochemical Energy, Dept. Energy and Environment, National Institute of Advanced Industrial Science and Techology

- (19) Development of 3D visualization technique for diffusion layer using active voltage contrast in FIB-SEM system
14:35

Y. Minami, N. Murata, Y. Shimada, N. Nakajima, A. Sugiyama, H. Arie, and Y. Kunimune / Analysis & Evaluation Technology Dept., Device Technology Div., Production and Technology Unit, Renesas Electronics

..... 15:00~15:20 Authors corner & break

Physical Analysis IV

p.m., Wed 27

Chairman Yasuo Cho

- (20) Characterizations of multi quantum well and impurity doping in nanowire-LEDs using atom probe tomography
15:20

N. Mayama^(a), S. Nakajima^(a), J. Koyama^(a), N. Arai^(a), K. Jogo^(a), S. Ishimura^(a), N. Sone^(b), T. Takeuchi^(c), and S. Kamiyama^{(c) / (a)} Physical Analysis Technology Center, Toshiba Nanoanalysis Corp., ^{b)}Koito Manufacturing Corp., ^{c)}Faculty of Science and Technology, Meijo Univ.

- (21) Low voltage SEM observation of p-type SiC adopting secondary electron energy filtering
15:45

A. Mikami, E. Nakatani, H. Fujiwara, and M. Hara / Power Electronics R & D Div. 1, MIRISE Technologies Corp.

..... 16:10~16:30 Authors corner & break

Panel Session

p.m., Wed 27

- 16:30 Theme: Characteristics of outsourced analysis / –Strengths–

17:50 Moderator: Yasunori GOTO / MIRISE Technologies

- (P1) sMIM imaging with the original processing

16:30 technology –managing every sample regardless of Si or compound semiconductor– K. Takagi / ITES Co., Ltd.

- (P2) Analytical techniques for approaching the root cause of power device failures
16:42

T. Hirano / Kobelco Research Institute, Inc.

- (P3) Introduction of original lab-HAXPES (DELMA: Display-type Ellipsoidal mesh analyzer)
16:54

M. Taguchi / Toshiba Nanoanalysis Corp.

- (P4) Analysis services in toray research center for cutting-edge semiconductor devices
17:06

U. Matsuwaki / Toray Research Center Inc.

- (P5) Proposal of LSI internal state analysis

17:18 Y. Matsumoto / Evaluation Analysis Dept., Renesas Engineering Services Co., Ltd.

- (P6) Analysis of lithium-ion batteries damaged by ignition
17:30

K. Takamori / Oki Engineering Co., Ltd.

..... 17:42~17:50 Networking with panelists

- (22) Closing remarks

17:50 K. Nakamae / Chairman, The Institute of NANO Testing

19 Author Index

• Numbers show presentation numbers in the technical program.

A–D

Arai, N. 20

Arie, H. 19

Arima, K. 10

Cho, Y. 5, 16, 17

Claassen, R. C8

De, I. 3

E–G

Endo, K. T1

Fujiwara, H. 21

Fukui, T. 4

Ida, C. 8

Ieda, M. 6

Ikeo, N. 18

Hamaguchi, A. 8

Ikita, K. 18

Hara, M. 21

Inomata, K. C3

Hashimoto, T. 2

Hattori, T. 6

Hirai, K. C2

Hirano, T. C5, P2

Hisasue, A. 10

Fujiwara, H. 21

H–I

Jogo, K. 20

Honbu, S. 11

J–K

Kamiyama, S. 20

Kato, M.....	4
Kawahara, H.....	C3
Keleher, M.....	3
Kida, T.....	C1
Koga, K.....	15
Konishi, K.....	C6
Koshikawa, K....	14
Koyama, J.....	20
Kunihiro, S.....	9
Kunimune, Y....	19
Kuo, Y.....	2
L–M	
Maeda, E.....	C7
Maeda, H.....	10
Matsui, N.....	11
Matsumoto, T.	14, 16
Matsumoto, Y....	P5
Matsuo, S.....	C5
Matsuwaki, U....	P4
Mayama, N.....	20
Midoh, Y....	7, 12, 13
Mikami, A.....	21
Minami, Y.....	19
Minoshima, K....	I1
Mitsui, T.....	I2
Miura, N....	7, I3, 12, 13
Miyoshi, M.....	3
Morikawa, A....	T2
Murata, N.....	19
N–P	
Nakajima, N....	19
Nakajima, S....	20
Nakamae, K.1,	7, 12, 13, 22
Nakashima, Y....	C4
Nakatani, E....	21
Nakayama, Y....	C8
Nikaido, M....	C2
Nojima, K.....	8
Nomura, S.....	11
Ogata, Y.....	16
Okada, T.....	7
Okai, N.....	6
Okano, N.....	C5
Okubo, T.....	11
Okude, J.....	8
Tokuda, N....	16
Tsukada, H....	2
Tsukui, H.....	C3
Tsutsumi, K....	18
Uchida, T.....	18
Ukai, T.....	10
Q–S	
Rob, C.....	C4
Sasaki, K.....	2
Sato, A.....	C7
Sato, M.....	9
Sato, T.....	T2
Sawamura, Y....	C2
Yamamoto, H....	11
Shimada, Y....	19
Sone, N.....	20
Yamaue, T.....	15
Strojwas, M....	3
Sugiyama, A....	19
Sukegawa, J....	C4
Zhang, X.....	16
T–V	
Taguchi, M.....	P3
Taguchi, N....	18
Takagi, K.....	P1
Takagishi, Y....	15
Takahashi, T....	C2
Takamori, K....	P6
Takemoto, T....	12
Takeuchi, T....	20
Tanaka, A.....	18
Tanaka, H....	9
Tanizaki, H....	2
Tawara, T....	4
EFA systems, FIB, SEM and TEM systems for Device Analysis and Circuit Edit	
W–Z	
Wada, S.....	11
Wong, M.....	9
Sawamura, Y....	C2
Yamamoto, H....	11
Shimada, Y....	19
Yamasue, K....	5, 16, 17
Yamaue, T.....	15
Yokouchi, K....	18
Zhang, X.....	16

20 Exhibition

Date & time:

Monday, 25 October 2021, 9:30–17:00

Tuesday, 26 October 2021, 9:30–17:00

Wednesday, 27 October 2021, 9:30–17:00

Venue:

Virtual

1. ITES Co., Ltd:

Introduction of power semiconductor evaluation and analysis

2. Semilab Japan: (C1)

Defect Inspection Tool En-Vision

3. AD Science Inc.:

Micro Manipulators, In-situ Downstream Asher, BSE detector, Micro Furnace

4. Toshiba Nanoanalysis Corporation:
Semiconductor Analysis Services (Atom probe tomography (APT), Labo-type HAXPES)
5. Nippon Scientific Co., Ltd.:
Laser Decap System PL201D and others
6. Oki Engineering Co., Ltd.:
The New Failure Analysis System using Lock-In Thermal Emission
7. TOOL Corporation: (C2)
Layout and Schematic Analysis in HAMAMATSU Interface Suite
8. Hitachi High-Tech Corporation:
Innovation, Synergy, Solutions - New EM Lineup
9. Thermo Fisher Scientific Group FEI Company Japan Ltd.:
EFA systems, FIB, SEM and TEM systems for Device Analysis and Circuit Edit
10. TOYO Corporation:
TESCAN FIB-SEM system and AFM-in-SEM
11. Renesas Engineering Services Co., Ltd.: (C3)
Introduction of nano prober service for Advanced process products
12. JEOL Ltd.:
High Throughput Analytical Electron Microscope JEM-ACE200F
13. TOKI COMMERCIAL CO., LTD.: (C4)
Analysis support system
14. KOBELCO research institute: (C5)
Ultra-thin film evaluation combining planar STEM observation and surface analysis technologies
15. ASTRON, Inc: (C6)
CAD-Navigation system AZSA-HS
16. Zeiss: (C7)
Multimodal nano/micro testing with ZEISS electron and X-ray microscopes
17. APOLLOWAVE Corporation: (C8)
NANO ? Robotics Solutions for Electron Microscopes

21 List of Associate Members

(in alphabetic order, 11 October 2021)

- Aamilia Japan G.K.
- AD Science Co.
- ADVANTEST CORPORATION
- AITRANS corporation
- APOLLOWAVE Corp.
- Applied Materials, Inc.
- ASTRON Inc.
- ATE Service Corp.
- Atomicscale Electromagnetic Field Analysis Platform
- Canon Marketing Japan Inc.
- Carl Zeiss Co.,Ltd.
- FEI Company Japan Ltd.
- Hamamatsu Photonics K.K.
- HiSOL, INC.
- Hitachi High-Tech Science Corporation
- Hitachi High-Tech Corporation
- Hightec Systems Corp.
- ITES CO., Ltd.
- JEOL Ltd.
- KOBELCO RESEARCH INSTITUTE, INC.
- MARUBUN CORPORATION
- Nano Tech Solutions Inc.
- NIKON SOLUTIONS CO., LTD.
- Nippon Barnes Company, Ltd.
- Nippon Scientific Co., Ltd
- Oki Engineering Co., Ltd.
- Park Systems Japan Inc.
- Renesas Engineering Services, Co., Ltd.
- Semilab Japan
- Shining Technology Corporation
- TASMIT, Inc.
- Toki Commercial Co., Ltd.
- TOOL CORPORATION
- Toshiba Nanoanalysis Corporation
- TOYO Corporation

(Rev.: 10-26-2021)