28th Annual Meeting of MRS-Japan 2018

Program

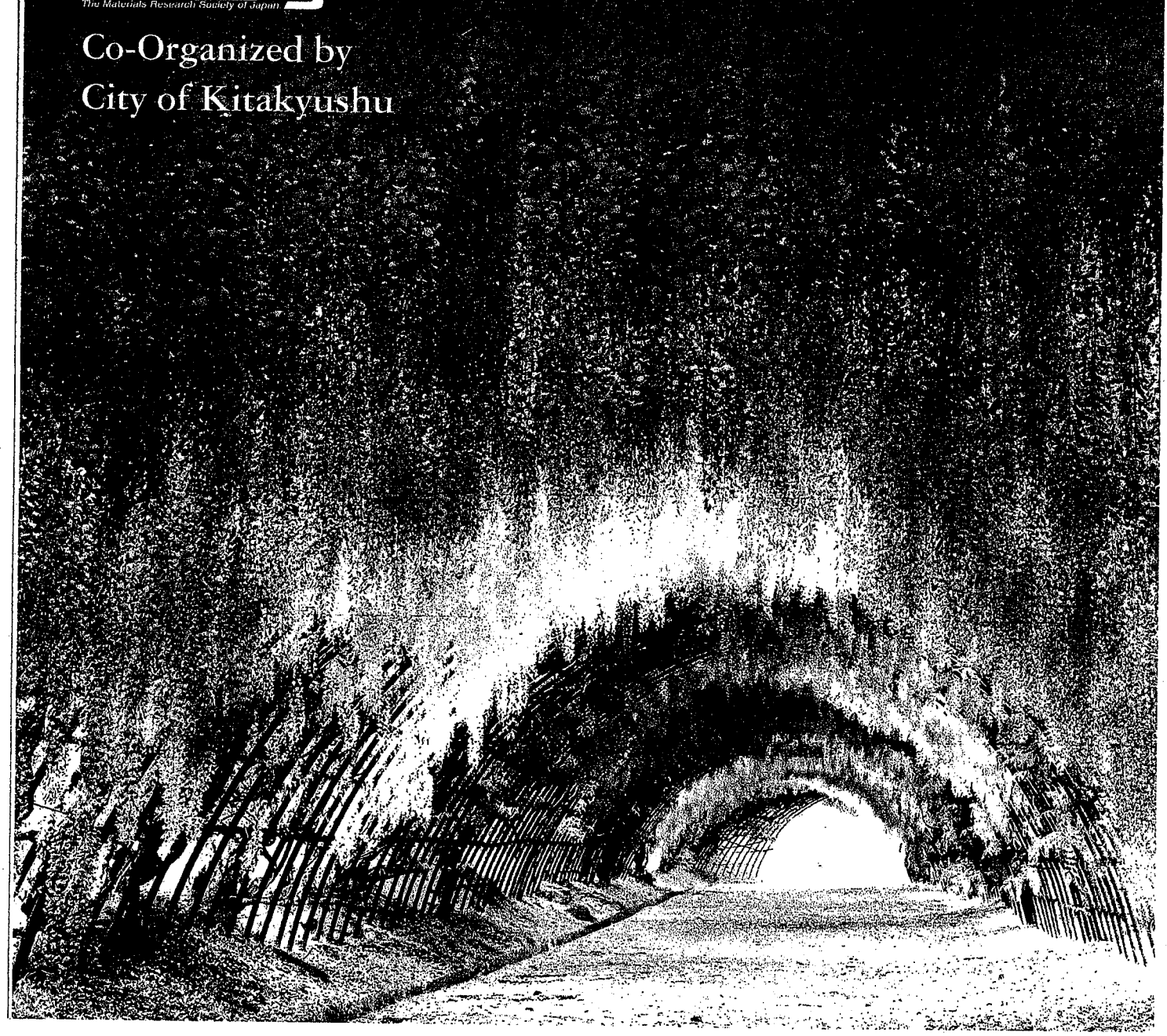
18-20 December 2018
Kitakyushu, Japan

Materials Innovation for Recycling-based Society

Organized by

MRS-J
The Materials Research Society of Japan

Co-Organized by
City of Kitakyushu



午後の部
Afternoon Oral Session

座長：鯉田　崇（産業技術総合研究所）
　　飯村　壮史（東京工業大学）
Chairs : Takashi KOIDA (AIST)
　　Soshi IIMURA (Tokyo Institute of Tech.)

16:00-16:15　A1-O20-010
マグネトロンスパッタリング法により成膜されたAl添加酸化亜鉛透明導電膜におけるエロージョン領域の構造及び電気特性への効果 / Effects of the erosion zone of magnetron sputtering targets on the spatial distribution of structural and electrical properties of highly transparent conductive Al-doped ZnO films

山本　哲也[2]、野本　淳一[1]、牧野　久雄[2]、稲葉　克彦[3]、小林　信太郎[3]（[1]産業技術総合研究所先進コーティング技術研究センター、[2]高知工科大学総合研究所、[3]株式会社リガクX線研究所）

Tetsuya YAMAMOTO[2], Junichi NOMOTO[1], Hisao MAKINO[2], Katsuhiko INABA[3], Shintaro KOBAYASHI[3] ([1] Advanced Coating Technology Research Center, Research Institute, National Institute of Advanced Industrial Science and Technolog, [2] Research Institute, Kochi University of Technology, [3] X-ray Research Laboratory, Rigaku Corporation)

16:15-16:30　A1-O20-011
反応性プラズマ蒸着法により成膜したSn添加In_2O_3極薄非晶質膜における電気的性質 / Electrical properties of amorphous very thin Sn-doped In_2O_3 films grown by reactive plasma deposition

古林　寛[1]、木下　公男[2]、前原　誠[2]、北見　尚久[1,2]、酒見　俊之[2]、牧野　久雄[1]、山本　哲也[1]（[1]高知工科大学マテリアルデザインセンター、[2]住友重機械工業株式会社）

Yutaka FURUBAYASHI[1], Kimio KINOSHITA[2], Makoto MAEHARA[2], Hisashi KITAMI[1,2], Toshiyuki SAKEMI[2], Hisao MAKINO[1], Tetsuya YAMAMOTO[1] ([1] Materials Design Center, Kochi University of Technology, [2] Sumitomo Heavy Industries, ltd.)

16:30-16:45　A1-O20-012
ゾルゲルディップコーティング法で作製した酸化亜鉛の特性 / Structural properties of ZnO thin films grown by sol-gel dip-coating process

森本　康弘、安部　功二、南谷　勇樹（名古屋工業大学）

Yasuhiro MORIMOTO, Koji ABE, Yuki NANYA (Nagoya Institute of Technology)

16:45 ～ 16:50 おわりに　Closing Remarks

鯉田　崇（産業技術総合研究所）

Takashi KOIDA (AIST)

12月20日（木）
December 20 (Thu.)
北九州国際会議場　イベントホール
Kitakyushu International Conference Center Event Hall

ポスターセッション
Poster Session

10:00-11:50　A1-P20-001
フレキシブルエレクトロニクスのためのFTO-SiO_2電界紡糸ナノファイバ不織布の作製 / Electrospun FTO-SiO_2 nanofiber mat for flexible electronics

一木　晃雅、ビン ムクリッシュ ムハンマド、吉永　賢、野見山　輝明、堀江　雄二（鹿児島大学大学院理工学研究科）

Akimasa ICHIGI, Muhammad Zobayer BIN MUKHLISH, Ken YOSHINAGA, Teruaki NOMIYAMA, Yuji HORIE (Graduate School of Science and Engineering, Kagoshima University)

10:00-11:50　A1-P20-002
Cu_2O薄膜上へのZnOナノロッドの化学溶液析出法による堆積と構造及びフォトルミネッセンス特性 / Chemical bath deposition of ZnO nanorods on Cu_2O films and their structural and photoluminescence properties

寺迫　智昭[1]、松井　健之介[2]、三島　健[2]、矢木　正和[3]（[1]愛媛大学大学院理工学研究科、[2]愛媛大学工学部、[3]香川高等専門学校）

Tomoaki TERASAKO[1], Kennosuke MATSUI[2], Ken MISHIMA[2], Masakazu YAGI[3] ([1] Graduate School of Science and Engineering, Ehime University, [2] Faculty of Engineering, Ehime University, [3] National Institute of Technology, Kagawa College)

10:00-11:50　A1-P20-003
化学溶液析出法によるLiドープCuO薄膜の作製と電気的特性 / Preparation and electrical characterization of Li-doped CuO thin films by chemical bath deposition

岡田　英之（愛媛大学大学院理工学研究科）

Hideyuki OKADA (Graduate School of Science & Engineering, Ehime University)

10:00-11:50　A1-P20-004
ナノ構造と化学組成を制御したAl_2O_3 (0001)表面へのグリシンの吸着挙動 / Behavior of glycine adsorption on nanostructure / chemical composition / controlled surface of Al_2O_3 (0001) single crystal

伊美　拓哉[1]、齋藤　絢香[1]、西川　博昭[2]（[1]近畿大学大学院生物理工学研究科、[2]近畿大学生物理工学部）

Takuya IMI[1], Ayaka SAITOU[1], Hiroaki NISHIKAWA[2] ([1] Graduate School of Biology-Oriented Science and Technology, Kindai University, [2] Faculty of Biology-Oriented Science and Technology,Kindai University)

10:00-11:50　A1-P20-005
$CaFeO_x$ / $LaFeO_3$ 超格子および積層膜の誘起強磁性とその発生メカニズム / Induced ferromagnetism and its mechanism in $CaFeO_x$ / $LaFeO_3$ superlattices and multilayers

Emi FUNAHASHI[1], Kozo MATSUMOTO[1], Takeshi ENDO[2] ([1] Graduate School of Humanity-Oriented and Engineering, Kindai University, [2] Molecular Engineering Institute, Kindai University)

10:00-11:50 A1-P20-037

Au/TiO_2光触媒ナノ粒子を用いるメチルオレンジの中性・酸性溶液中での光分解増強 / Enhanced photocatalytic degradation of methyl orange by Au/TiO_2 nanoparticles in neutral and acidic solutions

有村 優奈[1]、松田 佳奈子[1]、田中 茉優[1]、河済 博文[1]、宇都 慶子[2]、辻 正治[2]、林 潤一郎[2]、吾郷 浩樹[3]、辻 剛志[4] ([1]近畿大学産業理工学部、[2]九州大学グリーンテクノロジーセンター、[3]九州大学グローバルイノベーションセンター、[4]島根大学総合理工学部)

Yuna ARIMURA[1], Kanako MATSUDA[1], Mayu TANAKA[1], Hirofumi KAWAZUMI[1], Keiko UTO[2], Masaharu TSUJI[2], Jun-ichiro HAYASHI[2], Hiroki AGO[3], Takeshi TSUJI[4] ([1] Faculty of Humanity-Oriented Science and Engineering, Kindai University, [2] Green Technology Center, Kyushu University, [3] Global Inovation Center, Kyushu University, [4] Interdisciplinary Faculty of Science and Engineering, Shimane University)

10:00-11:50 A1-P20-038

PAMPSハイドロゲルによる水溶液中の金属イオンの吸着・回収技術 / Adsorption and recovery technology for various metal ions in aqueous solution using PAMPS hydrogel

杉本 亮弥、増田 彩花、西田 哲明、岡 伸人 (近畿大学)

Ryoya SUGIMOTO, Sayaka MASUDA, Tetsuaki NISHIDA, Nobuto OKA (Kindai University)

10:00-11:50 A1-P20-039

緑潮形成多糖ウルバンからの重金属イオン吸着ゲルの開発 / Polysaccharide ulvan gel from green-tide forming chlorophyta: Synthesis and application in the removal of heavy metal ions from aqueous solutions

菅野 憲一、福島 健太 (近畿大学 産業理工学部)

Kenichi KANNO, Kenta FUKUSHIMA (Faculty of Humanity-Oriented Science and Technology, Kindai University)

10:00-11:50 A1-P20-040

可視光および近赤外光照射下におけるABC光半導体のカビに対する抗菌効果 / Antifungal effect of ABC semiconductor by irradiation of visible light and near-infrared light

辻塚 誠一郎[1]、宮本 樹里[1]、鈴木 尚幸[1]、小林 加奈子[1]、伊東 謙吾[2]、田中 賢二[1] ([1]近畿大学大学院産業理工学研究科、[2]株式会社伊都研究所)

Seiichiro TSUJITSUKA[1], Juri MIYAMOTO[1], Naoyuki SUZUKI[1], Kanako KOBAYASHI[1], Kengo ITO[2], Kenji TANAKA[1] ([1] Graduate School of Humanity-Oriented Science and Engineering, Kindai University, [2] Ito Research Institute Co.,Ltd)

10:00-11:50 A1-P20-041

可視光および近赤外光照射下におけるABC光半導体細菌に対する抗菌効果 / Antibacterial effect of A semiconductor by irradiation of visible light ar near-infrared light

宮本 樹里[1]、辻塚 誠一郎[1]、鈴木 尚幸[1]、小林 加奈子[1]、伊東 謙吾[2]、田中 賢二[1] ([1]近畿学大学院産業理工学研究科、[2]株式会社伊都研究所)

Juri MIYAMOTO[1], Seiichiro TSUJITSUKA[1], Naoyuki SUZUKI[1], Kanako KOBAYASHI[1], Kengo ITO[2], Kenji TANAKA[1] ([1] Graduate Schoo Humanity-Oriented Science and Engineering, Kind University, [2] Ito Research Institute Co.,Ltd)

10:00-11:50 A1-P20-042

ABC光半導体の暗所での抗菌活性は遮光前の可視光射によって増強される / Antibacterial activity of ABC semiconductor in the dark is enhanced b previous irradiation of visible light before shielding

小林 加奈子[1]、辻塚 誠一郎[1]、宮本 樹里[1]、鈴木 尚幸[1]、伊東 謙吾[2]、田中 賢二[1] ([1]近畿大大産業理工学部、[2]株式会社伊都研究所)

Kanako KOBAYASHI[1], Seiichiro TSUJITSUKA[1], Juri MIYAMOTO[1], Naoyuki SUZUKI[1], Kengo IT Kenji TANAKA[1] ([1] School of Humanity-Oriented Science and Engineering, Kindai University, [2] Ito Research Institute Co.,Ltd)

10:00-11:50 A1-P20-043

水分解光触媒活性における助触媒の一原子置換効果解明 / Elucidation of one-atom replacement eff of cocatalyst on water-splitting photocatalytic activity

林 瑠衣[1]、藏重 亘[1]、若松 光祐[1]、岩瀬 顕秀[1]山添 誠司[2]、工藤 昭彦[1]、根岸 雄一[1] ([1]東京理大学大学院理学研究科、[2]首都大学東京大学院理工学究科)

Rui HAYASHI[1], Wataru KURASHIGE[1], Kosuke WAKAMATSU[1], Akihide IWASE[1], Seiji YAMAZOE[2], Akihiko KUDO[1], Yuichi NEGIS ([1] Graduate School of Science, Tokyo University of Science, [2] Graduate School of Science and Engineer Tokyo Metropolitan University)

オーラルセッション Oral Session

Symposium	Oral Presentation								
	Dec. 18, 2018			Dec. 19, 2018			Dec. 20, 2018		
	AM		PM	AM		PM	AM		PM
	9:00 - 12:00	13:20 - 14:00	14:15 - 18:00	8:30 - 12:00	13:20 - 14:00	14:15 - 18:00	8:30 - 12:00	13:20 - 14:00	14:15 - 17:00
	宗宮重行先生 追悼シンポジウム Shigeyuki Somiya Memorial Symposium			国際会議場11会議室 B会場		14:30 - 16:30			
A-1				H		H	H		H
A-2	I			I					
A-3			P	P		P			
B-1	C		C	C					
B-2	M		M	M					
B-3				Z		Z			
B-4				Y		Y			
B-5	S		S	S		S			
C-1				O		O			
C-2	E		E	E		E			D
C-3	D		D	D		D	D		
D-1	K		K			K			
D-2				R		R	E		E
E-1			W	W		W			
E-2				B			B		B
E-3			F						
F-1							F		F
F-2				F		F			
F-3	T		T	T					
F-4	H（研究会）		H（研究会）			G	G		
F-5	Q		Q	Q		Q			
F-6				L		L			
F-7				A		A	A		A
F-8				K		I	I		I
F-9						C	C		C
G-1			U	U		U			
G-2			V	V		V			

特別講演 / Plenary Lectures / メインホール（A会場）

会場		
A	メインホール Main hall	北九州国際会議場 Kitakyushu International Conference Center
B	11 会議室	
C	国際会議室 International Conference Room	
D	21 会議室 C,D	
E	21 会議室 A,B	
F	22 会議室	
G	31 会議室	
H	32 会議室	
I	33 会議室	
J	301 会議室	西日本総合展示場 West Japan General Exhibition Center
K	302 会議室	
L	303 会議室	
M	304 会議室	
N	305 会議室	
O	311 会議室	
P	312 会議室	
Q	313 会議室	
R	314 会議室	
S	315 会議室	
T	D 展示場	
U	E 展示場	
V	F 展示場	
W	G 展示場	
Y	会議室 2	ミクニワールドスタジアム Mikuni World Stadium
Z	会議室 5	

新館 3F / Annex 3F

AIM 3F

ポスターセッション Poster Session

Symposium	Poster Presentation 北九州国際会議場 イベントホール / Kitakyushu International Conference Center Event Hall								
	Dec. 18, 2018			Dec. 19, 2018			Dec. 20, 2018		
	AM	PM1	PM2	AM	PM1	PM2	AM	PM1	PM2
		14:10 - 16:00	16:10 - 18:00	10:00 - 12:00	14:10 - 16:00	16:10 - 18:00	10:00 - 12:00	14:10 - 16:00	
A-1							43		
A-2		7							
A-3						17			
B-1					18				
B-2					4				
B-3			20						
B-4				66					
B-5				21					
C-1						16			
C-2			19						
C-3			21						
D-1				13					
D-2							20		
E-1			30						
E-2					25				
E-3									
F-1						10			
F-2			18						
F-3					39				
F-4				1					
F-5									
F-6			10						
F-7						45			
F-8						42			
F-9							38		
G-1							37		
G-2							28		

Antifungal effect of ABC semiconductor by irradiation of visible light and near-infrared light

S.Tsujitsuka[1)], J.Miyamoto[1)], N.Suzuki[1)], K.Kobayashi[1)], K. Ito[2)] and *K.Tanaka[1)]
[1)] Grad.Sch.Humanity-Oriented Sci.&Eng.,Kindai Univ, Iizuka-shi, Fukuoka, Japan, [2)] Ito Research Institute Co.,Ltd
*tanaka@fuk.kindai.ac.jp

Our ABC complex material, which is composed of Ag nanoplate, boron resin and clay, is expected to be used as a novel paintable semiconductor [1, 2]. This material shows strong antibacterial activity against pathogenic or hazardous bacteria in the dark and the inhibitory effect is enhanced by irradiation of visible light and near infrared light, which will be reported by our colleague in this meeting. We also report the antifungal effect of ABC semiconductor against the fungi which cause decay of food and/or residential environment.

Antifungal test was carried out by the scheme (Fig.1) arranged of the "Test method for antifungal activity of photocatalytic products under photoirradiation" (JIS R1705). It was confirmed that ABC semiconductor killed effectively the fungal spores of *Aspergillus niger* NBRC105649, *Trichoderma virens* NBRC6355, *Penicillium pinophilum* NBRC6345 and *Penicilium citrinum* NBRC6352 in the dark. Further, the inhibition activity of ABC semiconductor to the spores was enhanced by irradiation of visible light (white,1000 lx) and near infrared light.

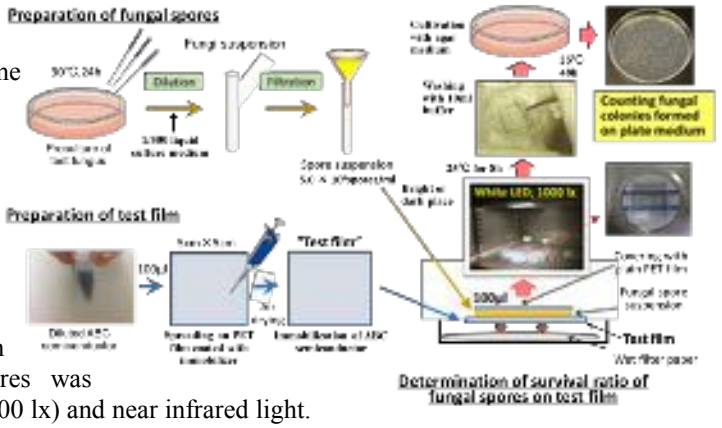


Fig. 1 Scheme for antifungal test of ABC semiconductor

[1] K. Ito, Material Forum, Optical Molecule Engineering, sponsored by AIST, Aug. 30 (2013).
[2] T.Nishibe and K.Ito, ",Value-Added ABC Semiconductor Material for Various Applications" Proc. 78th JJSAP-OSA Joint Symposia, Hakata, Japan, 6a-A410-8,Sept. 2017.

A1-P20-041

Antibacterial effect of ABC semiconductor by irradiation of visible light and near-infrared light

J.Miyamoto[1)], S.Tsujitsuka[1)], N.Suzuki[1)], K.Kobayashi[1)], K. Ito[2)] and *K.Tanaka[1)]
[1)] Grad.Sch.Humanity-Oriented Sci.&Eng.,Kindai Univ, Iizuka-shi, Fukuoka, Japan, [2)] Ito Research Institute Co.,Ltd
*tanaka@fuk.kindai.ac.jp

Silver is well known for its antibacterial action and has widely been utilized in various applications. We have been developing a novel scheme of semiconductor solar cells and antimicrobial activity using Ag complex materials, which we call ABC semiconductor [1, 2]. This material is composed of Ag nanoplate, boron resin and clay (Fig.1). ABC complex is dispersive in organic solvent therefore it can be used as a novel paintable semiconductor. Surface plasmon resonance on Ag illuminated by light with specific wavelength induces electrons around ABC complex and their charges are expected to kill microorganism's cells by sort of electromagnetic force. In this meeting, we will present the several results for the antibacterial test using pathogenic or hazardous bacteria.

In the antibacterial test which was arranged of the "Test method for antibacterial activity of photocatalytic products and efficacy under indoor lighting environment" (JIS R1752), ABC semiconductor showed strong antibacterial activity against all the tested bacterial strains including *Escherichia coli* JCM1649^T, *Staphylococcus aureus* NBRC12732, *Pseudomonas aeruginosa* NBRC3080, *Bacillus cereus* NBRC15305, *Bacillus subtilis* NBRC3134 in the dark. The antibacterial activity was enhanced by irradiation of visible light (white, 1000 lx) and near infrared light.

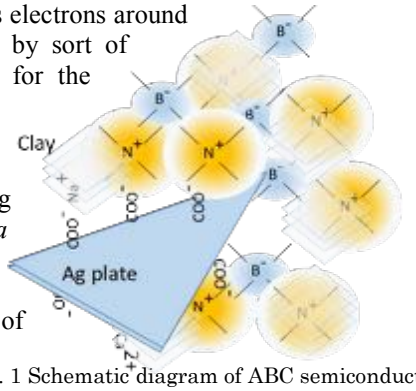


Fig. 1 Schematic diagram of ABC semiconductor

[1] K. Ito, Material Forum, Optical Molecule Engineering, sponsored by AIST, Aug. 30 (2013).
[2] T.Nishibe and K.Ito, ",Value-Added ABC Semiconductor Material for Various Applications" Proc. 78th JJSAP-OSA Joint Symposia, Hakata, Japan, 6a-A410-8,Sept. 2017.

Antibacterial activity of ABC semiconductor in the dark is enhanced by previous irradiation of visible light before shielding

K.Kobayashi[1)], S.Tsujitsuka[1)], J.Miyamoto[1)], N.Suzuki[1)], K. Ito[2)] and *K.Tanaka[1)]
[1)] Grad.Sch.Humanity-Oriented Sci.&Eng.,Kindai Univ, , Iizuka-shi, Fukuoka, Japan, [2)] Ito Research Institute Co.,Ltd
*tanaka@fuk.kindai.ac.jp

Novel paintable semiconductor, ABC complex which is composed of Ag nanoplate, boron resin and clay shows strong antimicrobial effect in the dark. The activity is enhanced by irradiation of visible light and near infrared light as reported by our colleague in this meeting. The antimicrobial activity of the semiconductor has been determined by the method which was arranged of those for photocatalyst. This "standard" method is mainly consisted of the work process in the bright room for preparing the "test piece" with PET film, photocatalyst/semiconductor and microorganisms, and the following sterilization process by incubation of the test piece for 8hr in the dark or under a white LED light(1000 lx). However, in ABC semiconductor there is observed capacitor discharging in the dark for a while after light shielding. Therefore, we thought that in ABC semiconductor the charges are expected to kill microorganisms by sort of electromagnetic force and the antimicrobial action in the dark is caused by the discharge after light shielding. Hence, we investigated the effect of previous irradiation of visible light to the ABC semiconductor on its antibacterial activity in the dark in the following incubation process with complete light shielding. As a result, previous irradiation to ABC semiconductor for long hours before light shielding drastically increased the antibacterial activity against *E.coli* in the dark of the following incubation process while that without previous irradiation was very low (Fig.1).

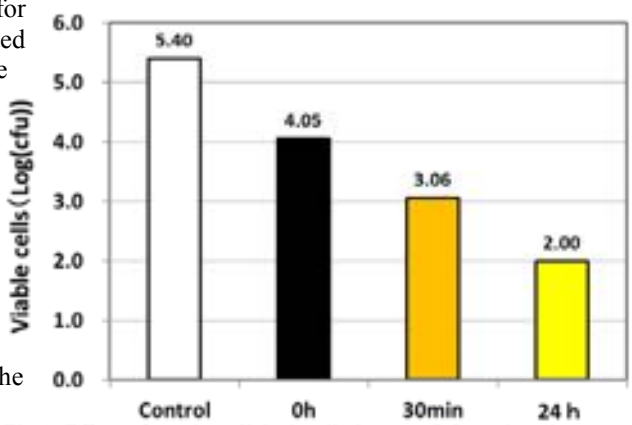


Fig.1 Effect of previous light irradiation to ABC semiconductor on the antibacterial activity against *E.coli* in the dark