International Workshop on Science and Patents 2014
(University hall, University of Tsukuba)

CO-HOST
TIMS, U. Tsukuba

THE CHEMICAL SOCIETY OF JAPAN

TIMS

公益社団法人
日本化学会

IWP 2014
2014. 9月5日

Call for papers

Tsukuba International Conference of Materials Science

TICMS 40

Secretariat: H. Goto (gotoh@ims.tsukuba.ac.jp)

Proceedings
International Letters of Chemistry, Physics and Astronomy (ILCPA)

IWP2014

IWP2011
IWP2012
IWP2013
IWP2014

9：00 **Registration**

9：30-9:35 **Rafaël H. L. Kiebooms** (European Patent Office, EPO)
Opening address

9:35-10:10 1 min oral presentation (20 persons) (Poster No. IWP01~IWP20)

<Chairman: R. Kiebooms>

10:10-10:30 **Md. Al-Helal**, (U. Tsukuba)
Brillouin scattering and *ab-initio* studies of the relaxor $44Pb(Mg_{1/2}Nb_{2/3})O_3$-$56PbTiO_3$ single crystal **(IWP65)**

10:30-10:50 **Makoto Kobayashi**, (Tsukuba U. Tech)
Bowling Support System for Visually Impaired Players **(IWP23)**

<Chairman: H. Goto>

10:50-11:10 **Madoka Mochida** (KEK)
Planning Science Café for Material Science **(IWP12)**

11:10-11:40 1 min oral presentation (20 persons) (Poster No. IWP21~IWP40)

<Chairman: R. Kiebooms>

11:40-12:00 **Mikihide Demura** (U. Tsukuba)
Mass cultivation of oil producing microalgae Botryococcus braunii. **(IWP37)**

Lunch

13:00-13:30 1 min oral presentation (20 persons) (Poster No. IWP41~IWP60)

<Chairman: Makoto Kobayashi, Tsukuba U. Tech>

13:30-14:35 **Rafaël H. L. Kiebooms** (EPO) **(IWP25-27)**
Protecting Your Invention by Means of Patents

14:35-15:05 1 min oral presentation (14 persons) (Poster No. IWP61~IWP74)

15:05- 17:30 Poster session

17:30-18:00 Closing ceremony

Comment on IWP2014
Rafaël H. L. Kiebooms (European Patent Office, EPO)

Awarding
Rafaël H. L. Kiebooms (EPO) and **Madoka Mochida** (KEK)

Address and closing declaration
Seiji Kojima
Dean of Division of Materials Science, U. Tsukuba
President of TICMS

1 min oral presentation

9:35-10:10 Poster No. IWP01~IWP20 (except IWP12)

IWP01 Polymer Photoluminescence

Soh Kushida, Daniel Braam, Kenichi Tabata, Junpei Kuwabara, Takaki Kanbara, Axel Lorke, Yohei Yamamoto

Whispering Gallery Mode Photoemission from π-Conjugated Polymer Spheres with High Reflective Index

IWP02 Ceramic science and technology

Hitoshi Nishijima, Yoshikazu Suzuki

Effect of Fe-doping on the Piezoelectric Properties of Bi0.5Na0.5TiO3

IWP03 Polymerization in Liquid Crystal

Tomonori Ito, Tomoaki Jo, Jiuchao Dong, Hitoshi Hayashi, Hiromasa Goto

Electrochemical Polymerization in Ferroelectric Liquid Crystal Solvent

IWP04 Carbon Materials

Mari Watanabe, Masashi Kijima

Conversion of γ-Cyclodextrin Microcube into Carbon Materials under Various Pyrolytic Conditions

IWP05 Brillouin scattering

M. M. Rahaman, T. Imai, J. Miyazu, J. Kobayashi, S. Kojima

Elastic properties of $KTa_{1-x}Nb_xO_3$ (x=0.39) studied by Brillouin scattering and first-priciples calculation

IWP06 Metallic Nanomaterials

Kazuhiro Hashiguchi, Hisanori Tanimoto

Precursor state of hexagonal silver nanoprisms in silver citrate solution by visible-light irradiation

IWP07 Material Science

H . Kubo,T. Kashiwagi,Y. Saiwai,H. Minami,T. Kitamura, C. Watanabe, Y. Shibano, K. Sakamoto, T. Katsuragawa, T. Yamamoto, K. Kadowaki

Development of high power THz generation from Bi2Sr2CaCu2O8+δ stand-alone mesa structure

IWP08 The Production of Metallic Nanowires

Kohei Yamada,Tokushi Kizuka

In Situ Transmission Electron Microscopy of Molybdenum Nanocontacts: Structure and Electrical Properties

IWP09 Bioimaging / Raman imaging

Hiroaki Yoneyama, Hiroki Segawa, Nishimura Ken, Fukuda Aya, Hisatake Koji, Hideaki Kano

Molecular vibrational imaging of iPS cell colony using CARS microspectroscopy

IWP10 Microbiology

Yuta Katsumata[U], Kanako Kato, Yuko Kobayashi, Masanori Toyofuku, Nobuhiko Nomura

Effects of the signaling molecules in wastewater treatment system

IWP11 Optically Active Conjugated Polymers

Haoyue Shen, Hiromasa Goto

Synthesis and Optical Properties of (-)-β-Citronellol Modified Conjugated Polymer

IWP12 Science Communication

Madoka Mochida, Norifumi L. Yamada, Hitoshi Abe, Hiroko Ohshima, Noriko Usami

Planning Science Café for Material Science

IWP13 Physics

K. Mizuno, Y. Suzuki, Y. Arakawa, M. Komatsu, F. Kimizuka, T. Enomoto, K. Terao, K. Ohara, T. Kashiwagi, K, Kadowaki

Growth of FeSe single crystals

IWP14 Polymerization in liquid crystal on inorganic semiconductor

Yuki Kudo, Hiromasa Goto

A new method for preparing P-N junction by using electropolymerization

IWP15 Material science of ceramics

Natsumi Ishii, Yoshikazu Suzuki

Semiconductor double-oxide electrodes for dye-sensitized solar cells.

IWP16 Carbonization of polymer

Aohan Wang, Hiromasa Goto

Properties of multilayer heterographite structure obtained during the carbonization of polyaniline

IWP17 Photosynthesys

Yuhta Sorimachi, Masataka Nakazato and Masami Kobayashi

Lactonization of Chl *a* catalyzed by ground pineapple

IWP18 Hybrid Carbon Materials

Yusuke Aikyo,[U] Kenichi Tabata, Soh Kushida, Daichi Okada, Yohei Yamamoto

Hybrid of Polymer Spheres with Nanocarbon

IWP19 Superconducting devices

K. Nakade, T. Kashiwagi, Y. Saiwai, H. Minami, T. Kitamura, C.Watanabe,K.Asanuma,T.Yasui, Y. Shibano, T. Yamamoto, K. Kadowaki

Terahertz imaging systems using a high-T_c superconducting oscillator

IWP20 Glass Spectroscopy

Yukiko Kobayashi,[U] Tomohiko Shibata, Tatsuya Mori, Seiji Kojima

Terahertz Time-Domain Spectroscopy and Low-Frequency Raman Scattering of Crystalline and Glassy Pharmaceutical Indapamide

11:10-11:40 Poster No. IWP21~IWP40 (except IWP23, IWP25-27, IWP37)

IWP21 Porous Polymer and Porous Carbon

Takafumi Watanabe, Masashi Kijima

Synthesis of Rigid Conjugated Polymers Having Binaphthyl Unit for Constructing Porous Materials

IWP22 A polymer in complex system

Naoko Ueno [U], Hiromasa Goto

Doping-dedoping for a Chiral Conjugated Polymer in BZ Reaction

IWP23 Assistive Technology

Makoto Kobayashi

Bowling Support System for Visually Impaired Players

IWP24 Bioelectrochemistry

Nozomu Tsuruoka, Kazuki Murata, Seiya Tsujimura

Glucose oxidation catalyzed by FAD-dependent glucose dehydrogenase on methylene green modified electrode

IWP25 Intellectual Property and Conducting Polymers

Rafaël H.L. Kiebooms

Protecting your intellectual property by means of patents

IWP26 Intellectual Property and Conducting Polymers

Rafaël H.L. Kiebooms

The procedure to obtain the grant of a European patent

IWP27 Intellectual Property and Conducting Polymers

Rafaël H.L. Kiebooms

The seven deadly sins of the inventor

IWP28 Microbiology

Hiroko Shimamura[U], Masanori Toyofuku, Tomohiro Morohoshi, Tsukasa Ikeda, Nobuhiko Nomura

How does bacteria distinguish different luanguages?

IWP29 New D-π-A type polymer

ZhongMin Geng, Masashi Kijima

Synthesis and Characterization of Polymers Having Sulfone Unit for Blue Electroluminescence

IWP30 Electrochemistry

Jin Wang, Hiroaki Suzuki, Takaaki Satake

Coulometric microdevice for organophosphate pesticide detection

IWP31 Conjugation of Biology and Polymer Chem

Hiromasa Goto

New Culture Method of Paramecium in the Presence of Conducting Polymers

IWP32 Toward Highly Efficient Solar Cells
Methawee Nukunudompanich, Yoshikazu Suzuki
Methodology to control diameter and ordered-structure applied in DSSC

IWP33 Optical Properties of Semiconductors
Yohei Watanabe, Yuya Nemoto, Ken-ichi Hino, Nobuya Maeshima
Theoretical Study of Coherent Phonon Generation Accompanying Quantum Effects

IWP34 N-Enriched Carbon Materials
Kazuya Yamada[U], Masashi Kijima
Characterization of Nitrogen Enriched Carbon Materials Prepared by Pyrolysis of Melamine Based Polymers

IWP35 Physics
K, Terao[U], T. Kashiwagi, Y. Suzuki, Y. Arakawa, M. Komatsu, F. Kimizuka, T. Enomoto, Y. Mizuno, K. Ohara, K. Kadowaki
Single crystal growth and characterization of superconducting FeSe

IWP36 Metallic Nano Materials
Kento Inoda, Hisanori Tanimoto
Anomalous internal friction peak of ultra-thin Ag film at around 200K

IWP37 Production of Oils by Microbes
Mikihide Demura, Makoto M. Watanabe
Mass cultivation of oil producing microalgae Botryococcus braunii.

IWP38 Ferroelectric Polymer Colloids
Daichi Okada, Yohei Yamamoto
β-phase transformation of poly(vinylidene fluoride) and their colloidal crystallization

IWP39 Water purification filter for developing country
Yuta Nakagoshi[U], Yoshikazu Suzuki
Preparation and microstructural observation of $MgTi_2O_5$ with pseudobrookite-type structure

IWP40 Light Emitting Polymer
Shinnosuke Okabe [U], Masashi Kijima
Molecular Design of Alkoxy Substituted Poly(2,7-carbazole)s for Blue-Light Emitting Diode

13:00-13:30 (Poster No. IWP41~IWP60)

IWP41 Conjugated Polymers
Hirotsugu Kawashima, Norio Ota, Takeshi Yasuda, Hiromasa Goto
Magnetic and Oprical Properties of Conjugated Polymers Bearing Conjugated Side Chains

IWP42 The Production of Metallic Nanowires
Satoshi Murata and Tokushi Kizuka
Structure and Conductance of Atomic-Sized Tantalum Contacts

IWP43 Metallic Nano-materials

Takahiro Sato, Kosuke Suzuki, Hisanori Tanimoto

Characteristic Grain Boundary State of Nanocrystalline Gold

IWP44 Polymer Thin Films

Hiroki HAYASHI, Kosuke KAWABATA, Shigeki NIMORI, Hiromasa GOTO

Electrochemical Synthesis of High Anisotropic Polymer Films in Magnetically Aligned Smectic Liquid Crystal

IWP45 Ferroelectric Materials

Yohanes Christy [U], Kazuya Matsumoto, Seiji Kojima

Critical slowing down of ferroelectric $Ba_2NaNb_5O_{15}$ studied by broadband Brillouin spectroscopy

IWP46 Bioelectrochemistry

Ryo Ainai, Seiya Tsujimura

Evaluation of stability and high current cathode of biofuel cell utilizing bilirubin oxidase and ferricyanide.

IWP47 Fiber Material

Yuki Kaitsuka, Hiromasa Goto

Synthesis and Characterization of Conductive Cocoon

IWP48 Material Science

T. Katsuragawa [U], H. Minami, Y. Saiwai,T. Kitamura, C. Watanabe K. Asanuma, T. Yasui, K. Nakade, Y. Shibano, K. Sakamoto, H. Kubo, T. Yamamoto, T. Kashiwagi, K. Kadowaki

Development of High Power THz Oscillator by Using High Temperature Superconductor

IWP49 Photosynthesis

Daisuke Fukayama, Tatsuya Iemura, Hideaki Miyashita, Koji Iwamoto, Yoshihiro Shiraiwa, Tadashi Watanabe, Masami Kobayashi

IWP50 Lead-free ceramics

Takayuki Okano[U] and Yoshikazu Suzuki

Density change and piezoelectric property of $LiNbO_3$ via reactive sintering

IWP51 Peptide Assembly

Tsukasa Mizutaru[U], Toru Nakayama, Taro Sakuraba, and Yohei Yamamoto

Metal-Coordinated Peptide β-Sheet Assembly

IWP52 Electrochemical polymerization

Atsushi Matsumura, Fan Yang and Hiromasa Goto

Synthesis of borneol-containing Chiral Inducers and Optically Active Poly(3,4-ethylenedioxythio-phene).

IWP53 Semiconductor spintronics

Ryo Ishikawa, Ryota Akiyama, Shinji Kuroda

The effect of F-doping on magnetism in diluted magnetic semiconductor (Zn,Co)O thin films.

IWP54 Light Emitting Polymers

Tomohiro Okura, Masashi Kijima

Synthesis and Optical Characteristics of Poly(phenanthrocarbazole)

IWP55 Polymerization in liquid crystals

Jiuchao Dong, Kohsuke Kawabata, Hiromasa Goto

Electrochemical polymerization in cholesteric liquid crystal by using a novel chiral dopant

IWP56 Photosynthesys

Kanako Kimura, Daiki Fujinuma, Shinya Akutsu, Hideaki Miyashita, Masami Kobayashi

Detection of Chls *d* and *f* in processed foods

IWP57 Ceramics and Organic hybrid

Tasuku Kawashima, Ryosuke Maki, and Yoshikazu Suzuki

SEM observations of electrospun $BaTiO_3$ and PVA composite fibers

IWP58 Liquid Crystal and Polymer Technology

Tomoaki Jo, Jiuchao Dong, Aohan Wang, Hiromasa Goto

Synthesis and Properties of Chiral Inducer of Liquid Crystal Using Isoleucine

IWP59 Porous Materials

Yasuyuki Kimura, Masashi Kijima

Carbonization of Covalent Organic Frameworks Composed of a Tetraphenylmethane Unit

IWP60 Advanced Inorganic Materials

Ryosuke Maki, Haruta Mitsutaka, Hiroki Kurata, Yoshikazu Suzuki

Synthesis and Microstructure of Murataite-based Ceramics Obtained by Reactive Sintering

14:35-15:05 (Poster No. IWP61~IWP74)

IWP61 Carbonization of Woody Materials

Hidenori Amano [U], Masashi Kijima

Effect of Aldehyde Additives on Carbonization of Hydroxyethyl Cellulose

IWP62 Material science

K. Sakamoto [U], T. Kashiwagi, T. Kitamura, K. Nakade, K. Asanuma, T. Yasui, Y. Saiwai,Y. Shibano, H. Kubo, T. Yamamoto, H. Minami, and K. Kadowaki

Development of the THz radiation device made of a Bi2212 high T_c superconductor

IWP63 Quantum Computer

Hikaru Wakaura, Akira Okazaki, Hiroyasu Koizumi,

Transition Electric dipole moment of Spin Vortex Induced Loop Current

IWP64 Material Science

Kotaro Ohara [U], Yusuke Suzuki, Yuki Arakawa, Masashi Komatsu, Fumiya Kimizuka, Takuma Enomoto, Kazuki Mizuno, Kotaro Terao, Takanari Kashiwagi, Kazuo Kadowaki,

Single crystal growth of topological insulator Bi_2Te_2Se

IWP65 Brillouin scattering

Md. Al-Helal and Seiji Kojima

Brillouin scattering and *ab-initio* studies of the relaxor $44Pb(Mg_{1/2}Nb_{2/3})O_3$-$56PbTiO_3$ single crystal

IWP66 The Production of Metallic Nanowires

Shin Ashida and Tokushi Kizuka

In Situ Transmission Electron Microscopy of Zinc Nanocontacts

IWP67 Synthesis of Conjugated Polymers

Zhiyong Qin, Hiromasa Goto

Synthesis of π-Conjugated Polymers Based on Benzoate Unit Prepared by Suzuki Coupling Method

IWP68 Optical Properties of Semiconductors

Kento Suzuki[U] and Kiyoto Matsuishi

Optical and Structural Properties of Organic-Inorganic Perovskite Semiconductors

IWP69 Photosynthesis

Hirohisa Komatsu, Daiki Fujinuma, Shinya Akutsu, Daisuke Fukayama, Yuhta Sorimachi, Yuki Kato, Yoshinori Kuroiwa, Tadashi Watanabe, Hideaki Miyashita, Koji Iwamoto, Yoshihiro Shiraiwa, Mayumi Ohnishi-Kameyama, Hiroshi Ono, Hiroyuki Koike, Mayumi Sato, Masanobu Kawachi, Masami Kobayashi

Structural determination of DV-Chl *a*

IWP70 Polymerization in Liquid Crystal

Naoto Eguchi [U], Hiromasa Goto

Synthesis of Conjugated Polymer Film by Electrolytic Polymerization in Lyotropic Liquid Crystal

IWP71 Surface science

Izumi Mochizuki, K. Wada, T. Hyodo, T. Shidara, Y. Fukaya, M. Maekawa, A. Kawasuso, and A. Ichimiya

Positron diffraction experiments at the KEK Slow Positron Facility

IWP72 Functional Organic Materials

Hideyuki Kihara, Toshiaki Miura, Yukihiro Shimoi

Photoinduced Phase Change of Anthracene Compounds –Odd-Even Effect of Alkylene Spacer on Liquid Crystallinity and Phase Change Behavior–

IWP73 Enzyme electrode reaction

Hiroto Funabashi[U], Kazuki Murata, Seiya Tsujimura

Pore- size dependence of the enzyme electrode reaction in the mesopores

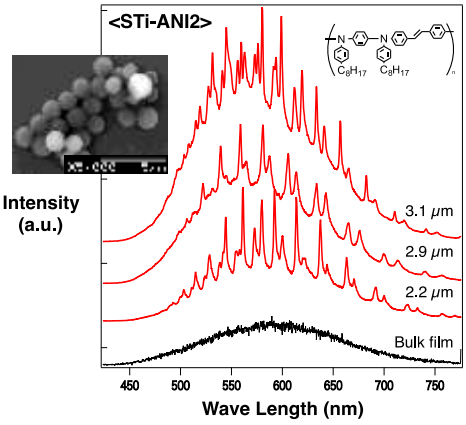
IWP74 Porous carbon electrode

Kazuki Murata, Seiya Tsujimura

Exceptionally high glucose current on hierarchically structured porous carbon electrode with "wired" glucose dehydrogenase

Master of ceremony: Miss Aohan Wang
Lightning engineer: MissYuki Kudo
Music: Dr. Goto

IWP01



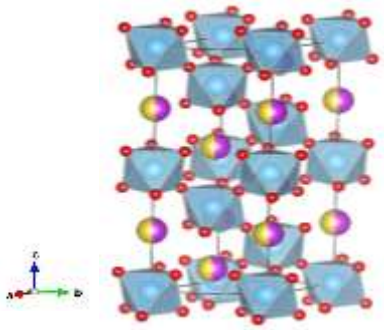
Polymer Photoluminescence

Whispering Gallery Mode Photoemission from π-Conjugated Polymer Spheres with High Reflective Index

Soh Kushida,[1] Daniel Braam,[2] Kenichi Tabata,[1] Junpei Kuwabara,[1] Takaki Kanbara,[1] Axel Lorke,[2] Yohei Yamamoto,[1]
[1] Faculty of Pure and Applied Sciences, Univ. of Tsukuba, [2]Department of Physics, Univ. Duisburg-Essen,
E-mail: s-kushida@ims.tsukuba.ac.jp

We found that π-conjugated alternating copolymers consisting of aniline and azobenzene or stilbene self-assemble to form microspheres that exhibit whispering gallery mode photoemission.

IWP02



Crystal structure of $Bi_{0.5}Na_{0.5}TiO_3$

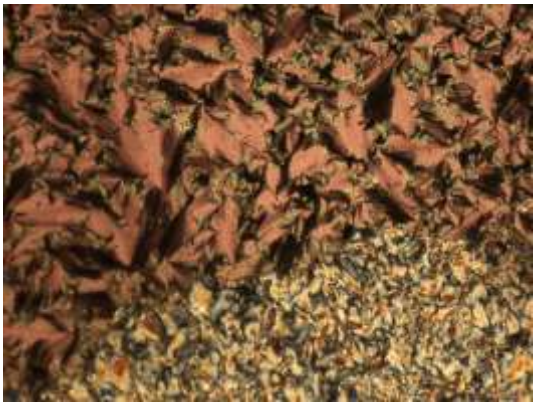
Ceramic science and technology

Effect of Fe-doping on the Piezoelectric Properties of $Bi_{0.5}Na_{0.5}TiO_3$

Hitoshi Nishijima and Yoshikazu Suzuki
Graduate School of Pure and Applied Sciences, University of Tsukuba
E-mail: s-nishijima@ims.tsukuba.ac.jp

$Bi_{0.5}Na_{0.5}TiO_3$ is a promising candidate for lead-free piezoelectric materials. Fe-doping on $Bi_{0.5}Na_{0.5}TiO_3$ is effective to enhance the piezoelectric properties.

IWP03



Polymerization in Liquid Crystal

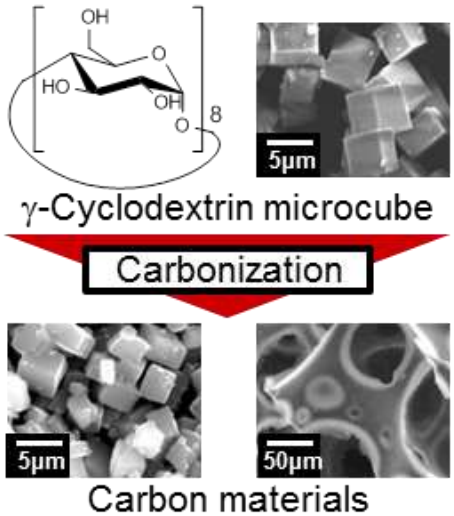
Electrochemical Polymerization in Ferroelectric Liquid Crystal Solvent

Tomonori Ito[1], Tomoaki Jo[1], Jiuchao Dong[1], Hitoshi Hayashi[2], Hiromasa Goto[1]

[1]Graduate School of Pure and Applied Sciences, Institute of Material Science, University of Tsukuba.
[2]DENSO CORPORATION
E-mail: gotoh@ims.tsukuba.ac.jp

A ferroelectric liquid crystal was synthesized, and electrochemical polymerization was carried out in the liquid crystal.

IWP04



Carbon Materials

Conversion of γ-Cyclodextrin Microcube into Carbon Materials under Various Pyrolytic Conditions

Mari WATANABE,[1,2] Masashi KIJIMA,[2,3]
[1]Grad. School of Pure & Appl. Sci., Univ. Tsukuba, [2] TIMS, [3]Fac. of Pure & Appl. Sci., Univ. Tsukuba
E-mail: s-watanabe@ims.tsukuba.ac.jp

CD microcube, a γ-cyclodextrin assembly, was converted into carbon materials under various pyrolytic conditions, and the carbonized samples were characterized by SEM, N_2 adsorption/desorption, and XRD analyses.

IWP05

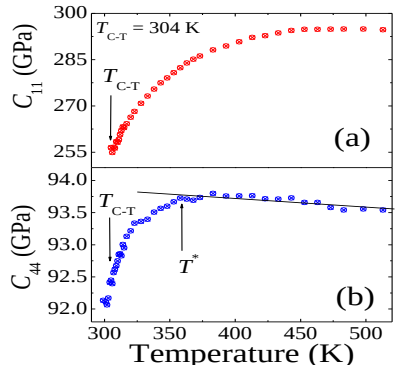


Fig. 1: Temperature dependence elastic constants (a) C_{11} and (b) C_{44} of the KTN39 single crystals. The solid line is guide to the eye.

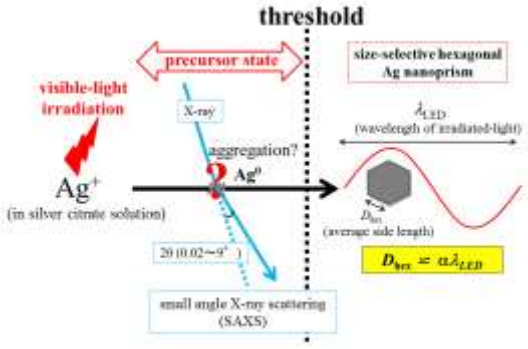
Brillouin scattering

Elastic properties of $KTa_{1-x}Nb_xO_3$ (x=0.39) studied by Brillouin scattering and first-priciples calculation

M. M. Rahaman[1*], T. Imai[2], J. Miyazu[2], J. Kobayashi[2], S. Kojima[1]
[1]University of Tsukuba, [2]NTT Device Innovation Center
E-mail: mijan_mse@ru.ac.bd

We studied elastic properties of the ferroelectric phase transition in $KTa_{0.61}Nb_{0.39}O_3$ (KTN39) with perovskite structure by micro-Brillouin scattering and first-principles calculations using density functional theory (DFT).

IWP06



Metallic Nanomaterials

Precursor state of hexagonal silver nanoprisms in silver citrate solution by visible-light irradiation

Kazuhiro Hashiguchi and Hisanori Tanimoto
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
E-mail: s-hashiguchi@ims.tsukuba.ac.jp

Formation of hexagonal silver nanoprisms beyond a threshold flux indicates existence of some precursor state. The precursor state is investigated in detail by small angle X-ray scattering.

IWP07

Material Science

Development of high power THz generation from Bi2Sr2CaCu2O8+δ stand-alone mesa structure

H.Kubo,[1]T.Kashiwagi,[1]Y.Saiwai,[1]H.Minami,[1]T.Kitamura, [1]C.Watanabe,[1] Y.Shibano, [1]K.Sakamoto, [1]T.Katsuragawa, [1]T.Yamamoto, [2]K.Kadowaki [1]
[1]University of Tsukuba,[2]NIMS
E-mail: s-kubo@ims.tsukuba.ac.jp

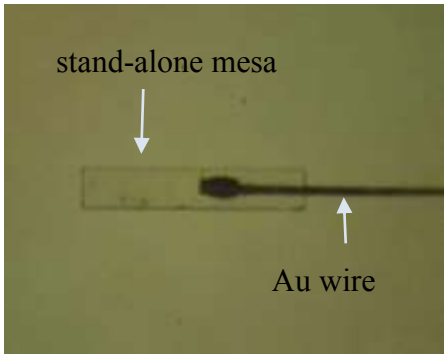
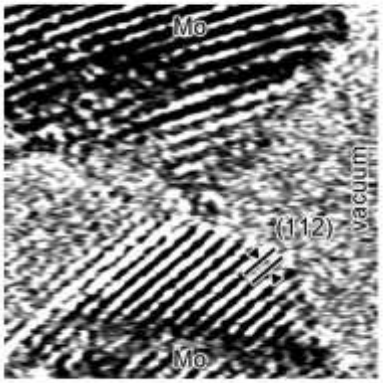


Figure1 Stand-alone type of mesa structure

The intense terahertz radiation from single crystal $Bi_2Sr_2CaCu_2O_{8+\delta}$ has been achieved by making a stand-alone type of mesa structure as compared with the former type.

IWP08

The Production of Metallic Nanowires



In Situ Transmission Electron Microscopy of Molybdenum Nanocontacts: Structure and Electrical Properties

Kohei Yamada and Tokushi Kizuka
Division of Materials Science, Univ. of Tsukuba.
E-mail: s1330147@u.tsukuba.ac.jp

Molybdenum contacts were produced by piezomanipulation inside a transmission electron microscope. The structure was observed *in situ* and simultaneously conductance was measured.

IWP09

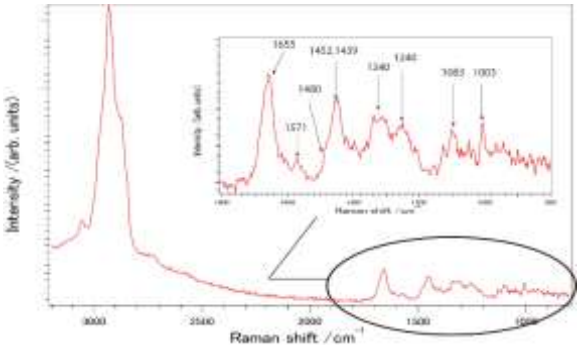


Figure 1. $\mathrm{Im}[\chi^{(3)}]$ spectra of iPS cells indicated by the arrow in Fig. 2

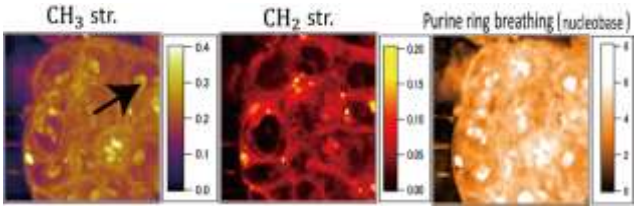


Figure 2. CARS images of iPS cells

Bioimaging / Raman imaging

Molecular vibrational imaging of iPS cell colony using CARS microspectroscopy

Hiroaki Yoneyama[1], Hiroki SEGAWA[2], Nishimura Ken[3], Fukuda Aya[3], Hisatake Koji[3], Hideaki Kano[1]
[1]Institute of Applied Physics, University of Tsukuba
[2]Department of Chemistry, School of Science, University of Tokyo
[3]Faculty of Medicine, University of Tsukuba
E-mail: hiro1028.bass@gmail.com

We have performed molecular vibrational imaging of iPS cells using nonlinear Raman spectroscopy in order to explore to find the spectroscopic signature of pluripotency

IWP10

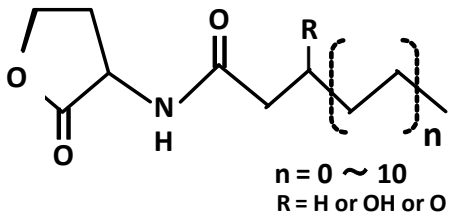


Fig. Structure of AHL

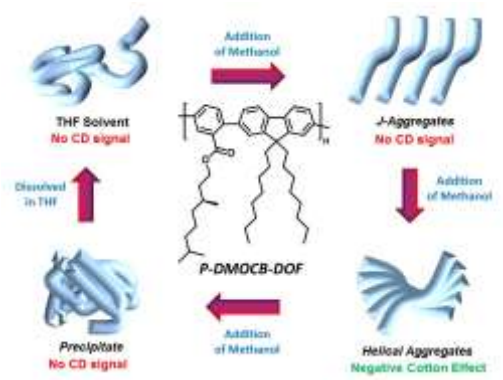
Microbiology

Effects of the signaling molecules in wastewater treatment system

Yuta Katsumata[1,U], Kanako Kato[1], Yuko Kobayashi[1], Masanori Toyofuku[1], Nobuhiko Nomura[1]
[1]Faculty of Life and Environment Sciences, Tsukuba University, [U]undergraduate
E-mail: s1313047@u.tsukuba.ac.jp (Y. Katsumata)

We pay our attention to signaling molecules as a new method for improving the activated sludge system. Addition of signaling molecules (AHL) showed high activity also at low temperature. The same tendency was seen also in the scaled-up system. Our study suggests that signaling molecules have positive effects in wastewater treatment.

IWP11



Optically Active Conjugated Polymers

Synthesis and Optical Properties of (-)-β-Citronellol Modified Conjugated Polymer

Haoyue Shen, Hiromasa Goto
University of Tsukuba
E-mail: gotoh@ims.tukuba.ac.jp

Optical properties of synthesized conjugated polymer with chiral side chain show solvent dependency due to different status.

IWP12

Science Communication

Planning Science Café for Material Science

Madoka Mochida[1], Norifumi L. Yamada[1], Hitoshi Abe[1], Hiroko Ohshima[1], Noriko Usami[1]
[1]Institute of Materials Structure Science, KEK
E-mail: madoka.mochida@kek.jp

Chocolate taste mainly depends on crystal structure of cocoa butter which has been studied by synchrotron X-rays.
We planned Science Café about physics of chocolate to experience how the microscopic structure affects its taste and texture.

IWP13

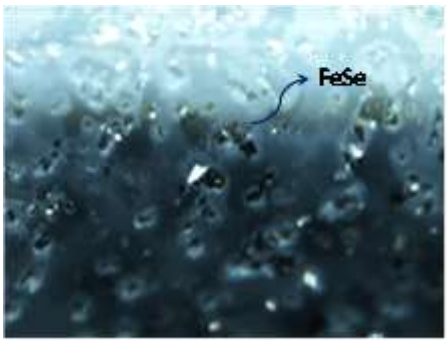


Fig1 : Small crystals of FeSe that have been grown by CVT.

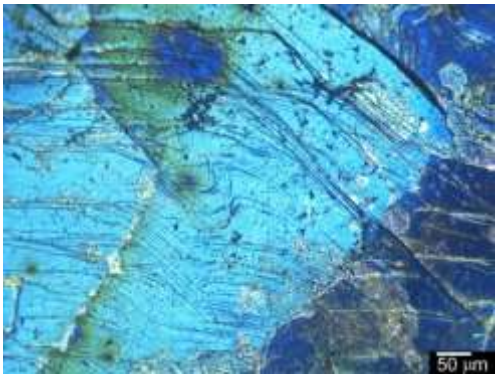
Physics

Growth of FeSe single crystals

K. Mizuno,[1]Y. suzuki,[1]Y. Arakawa,[1] M. Komatsu,[1]F. Kimizuka,[1]T. Enomoto,[1]K. Terao,[1] K. Ohara, [1] T. Kashiwagi,[1]and K, Kadowaki[1]
E-mail: s-mizuno@ims.tsukuba.ac.jp
[1]University of Tsukuba

To obtain better quality of the FeSe single crystals for the investigation physical properties, We have tried to grow Superconducting crystals of FeSe by chemical vapor transport(CVT).

IWP14



Polymerization in liquid crystal on inorganic semiconductor

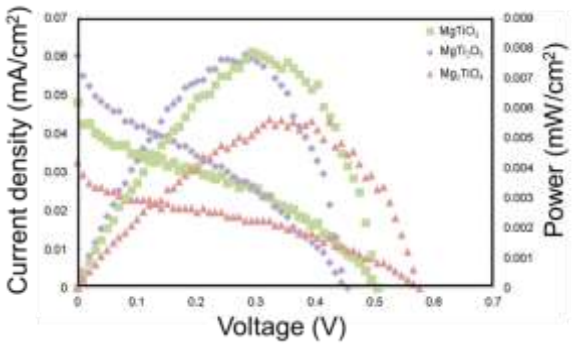
A new method for preparing P-N junction by using electropolymerization

Yuki Kudo, Hiromasa Goto
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
E-mail: s-ykudo@ims.tsukuba.ac.jp

Electropolymerization for preparing P-N junction on pyrite was carried out. This method allows construction of electro-devices easily.

IWP15

Material science of ceramics

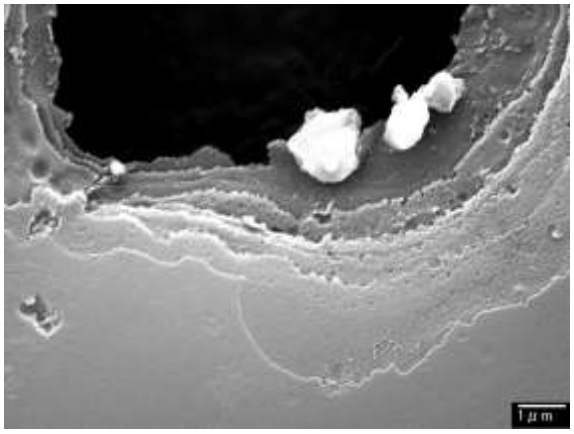


Semiconductor double-oxide electrodes for dye-sensitized solar cells.

Natsumi Ishii, and Yoshikazu Suzuki
Graduate school of Pure and Applied Sciences, University of Tsukuba.
E-mail: s-natsumi@ims.tsukuba.ac.jp

High efficiency of dye-sensitized solar cells by using $MgTiO_3$,$MgTi_2O_5$ and Mg_2TiO_4.

IWP16



Carbonization of polymer

Properties of multilayer heterographite structure obtained during the carbonization of polyaniline

Aohan Wang, Hiromasa Goto
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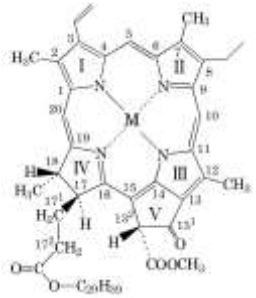
E-mail: s-awang@ims.tsukuba.ac.jp

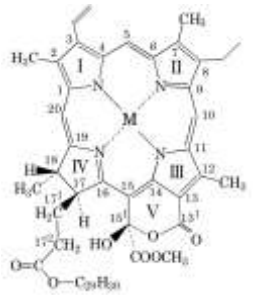
Multilayer heterographite showing metallic reflectance was obtained during the carbonization of polyaniline and its properties were measured.

IWP17



Chl *a*

oxidation



15[1]-OH-lactone

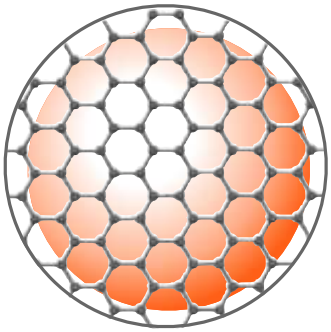
Photosynthesis

Lactonization of Chl *a* catalyzed by ground pineapple

Yuhta Sorimachi[1], Masataka Nakazato[2] and Masami Kobayashi[1]
[1]Division of Materials Science, Faculty of Pure and Applied Science, University of Tsukuba, Japan
[2]Chlorophyll Research Institute, Higashiyachiyo, Yamanashi, Japan
E-mail: s-sori@ims.tsukuba.ac.jp

Chlorophyll (Chl) *d* is expected to be oxidatively biosynthesized from Chl *a* in plant, whereas the biosynthetic pathway of Chl *d* in *Acaryochloris marina* has not yet been clarified. We have already reported the conversion of Chl *a* into Chl *d* with papain or with grated papaya in aqueous acetone at room temperature in the dark. Bromelain is also a proteolytic and thiol protease, a like papain, and present in pineapple. In this paper, we examined the reaction of Chl *a* catalyzed by grated pineapple. Expected conversion of Chl *a* → Chl *d* was not found, but novel conversion of Chl *a* into 15[1]-OH-lactone Chl *a* was observed. The lactonization observed here is important in food science, since there is a need to control the stability of Chls in food processing.

IWP18



Hybrid Carbon Materials

Hybrid of Polymer Spheres with Nanocarbon

Yusuke Aikyo,[U1] Kenichi Tabata,[2] Soh Kushida,[2] Daichi Okada,[2] Yohei Yamamoto,[1,2]
[1]School of Science and Engineering, [2]Graduate School of Pure and Applied Sciences, Univ. of Tsukuba
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We study synthesis and photoemission properties of polymer spheres hybridized with carbon nanomaterials.

IWP19

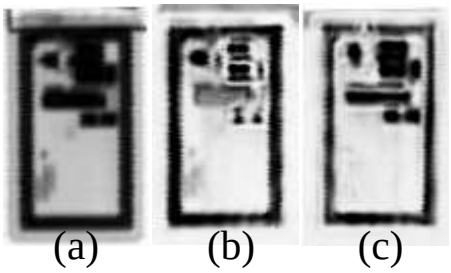


Fig.1. THz images of an ID card.
(a) Transmission image.
(b) Reflection image (front side).
(c) Reflection image (reverse side).

Superconducting devices

Terahertz imaging systems using a high-T_c superconducting oscillator

K. Nakade,[1] T. Kashiwagi,[1] Y. Saiwai,[1]
H. Minami,[1] T. Kitamura,[1] C. Watanabe,[1]
K. Asanuma,[1] T. Yasui,[1] Y. Shibano,[1]
T. Yamamoto,[2] K. Kadowaki[1]
[1] University of Tsukuba, [2] NIMS
E-mail: s-nakade@ims.tsukuba.ac.jp

We have developed a reflection type of the imaging system and a CT system at sub-terahertz frequencies using a high-T_c superconducting oscillator. Various images as shown in Fig.1. can be taken for variety of applications.

IWP20

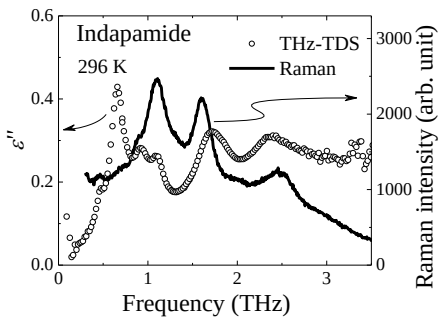


Fig. 1 Imaginary part of complex dielectric constant ε'' and Raman scattering spectra of crystalline IND.

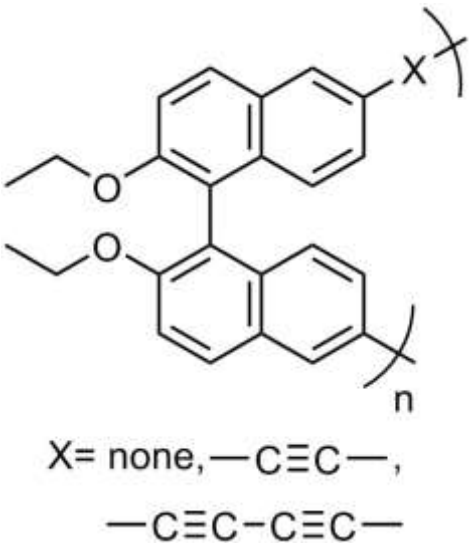
Glass Spectroscopy

Terahertz Time-Domain Spectroscopy and Low-Frequency Raman Scattering of Crystalline and Glassy Pharmaceutical Indapamide

Yukiko Kobayashi,[U,1,*] Tomohiko Shibata,[2] Tatsuya Mori,[2] Seiji Kojima[2]
[1]School of Engineering Sciences, University of Tsukuba [2]Graduate School of Pure and Applied Sciences, University of Tsukuba
E-mail: s1110988@u.tsukuba.ac.jp

Indapamide (IND) is a drug material used in the treatment of hypertension and is an organic glass former. We studied terahertz time-domain and Raman spectroscopy on crystalline and glassy IND.

IWP21



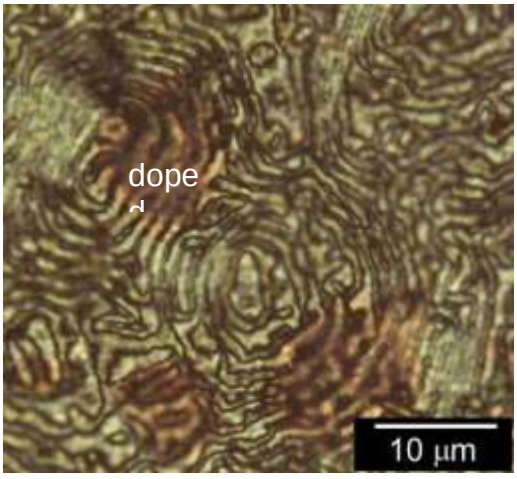
Porous Polymer and Porous Carbon

Synthesis of Rigid Conjugated Polymers Having Binaphthyl Unit for Constructing Porous Materials

Takafumi Watanabe,[1,2] Masashi Kijima,[2,3]
[1]Graduate School of Pure and Applied Sciences, University of Tsukuba, [2]TIMS, [3]Faculty of Pure and Applied Sciences, University of Tsukuba
E-mail: s-t.watanabe@ims.tsukuba.ac.jp

Rigid conjugated polymers consisting of chiral binaphthyl unit and appropriate junctions such as ethynylene and butadiynylene were synthesized for the purpose of constructing microporous polymers, which could be thermally converted into porous carbonized materials.

IWP22



A polymer in complex system

Doping-dedoping for a Chiral Conjugated Polymer in BZ Reaction

Naoko Ueno [u1], Hiromasa Goto[2]
[1]College of Engineering Sciences, University of Tsukuba, [2]Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba
E-mail: gotoh@ims.tsukuba.ac.jp (H.Goto)

Belousov-Zhabotinsky (BZ) reaction is known as an oscillating reaction. We observed the change in optical properties of a chiral polymer in BZ reaction.

IWP23

Assistive Technology

Bowling Support System for Visually Impaired Players

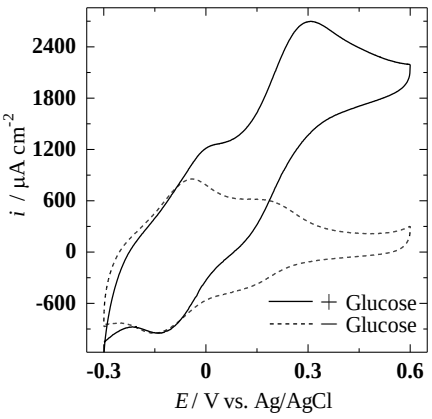
Makoto Kobayashi,[1]
[1]Dept. of Computer Science, Tsukuba Univ. of Technology,
E-mail: koba@cs.k.tsukuba-tech.ac.jp

"Blind bowling" is known as one of the popular sports for the visually impaired people. Although they can enjoy it with sighted assistant and it is well-adapted sports for them, they would like to know information by themselves, not from the assistant. The information includes the number of remaining pins, trajectory of the ball, and how the ball hit pins. Therefore, to fill that needs, a support system which automatically detects remaining pins and tells the number by computer voice was developed and tested by several blind players as a first step. The system worked well and it can make the game more enjoyable tor them because it tells not only the number of remaining pins of the player but also of other players' pins during the game.

IWP24

Bioelectrochemistry

Glucose oxidation catalyzed by FAD-dependent glucose dehydrogenase on methylene green modified electrode



Nozomu Tsuruoka, Kazuki Murata, Seiya Tsujimura
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba
E-mail: s1420430@u.tsukuba.ac.jp

Methylene green modified-porous carbon electrode, on which FAD-dependent glucose dehydrogenase is immobilized, shows catalytic current of glucose oxidation.

IWP25

Protecting your intellectual property by means of patents

Rafaël H.L. Kiebooms,[1]
1)European Patent Office, The Netherlands
Patentlaan 2-9, 2288EE Rijswijk, The Netherlands, rkiebooms@epo.org

Introduction

Successful business needs intellectual property (IP) protection based on a combination of IP rights (e.g. copyrights, design rights and patents), which provide detailed definitions of technical and artistic ideas and concepts. This IP rights portfolio is used as a basis for value assessment of the intellectual assets of a company. Each country in Europe has its own system for IP rights. For a uniform approach on patent rights, 38 European countries agreed to work together under the European Patent Convention (EPC).

For the EPO to grant a European patent in respect of an invention, its description has to meet certain criteria. These are laid down in the EPC and supported by the Guidelines for Examination, the latter being developed on the basis of the case law of the boards of appeal. The most important criteria to be met are the requirements that the invention, as defined in the patent application, is novel and involves an inventive step (Articles 54 and 56 EPC). These criteria are evaluated against the 'prior art', which consists of all knowledge made available to the public before the filing date of the patent application, commonly in the form of a publication. The evaluation ('examination') of the technical criteria is carried out in writing by an 'examining division' consisting of three technically qualified examiners (Article 18 EPC). If the examining division intends to refuse a patent application, the procedure is concluded by a non-public hearing ('oral proceedings'), which involves a highly technical assessment of the invention in view of scientific and technical literature to determine whether the patent application meets the EPC requirements. At the hearing the owner of the invention, also called 'applicant' or 'proprietor', is usually represented by a patent attorney.

The protection of intellectual property is an important issue to support the return on investment in research and development. Patents are one of a number of important tools that allow intangible intellectual knowledge developed by companies and universities to be protected. For scientists and engineers it is important to know what constitutes a patentable invention and to have a general idea about the procedure to apply for a patent.

The criteria of patentability

The main categories of intellectual property rights are among others patents, trade marks, design rights and copy rights. Patent rights are the main form of protection of scientific work. There are two major criteria which determine what is a patentable invention: the invention must be novel and must involve an inventive step. These criteria are applied similarly throughout the global patent system. The general approach to evaluate these criteria will be explained for the international and European patent system while pointing out the parallelisms with the Japanese patent system.

Procedural aspects of filing a patent application

Each region or country has its own specific legal and procedural system. However, each patent system is characterized by general common principles concerning the procedure of applying for a patent. The two important phases in the procedure are, firstly, the investigation of the scientific literature published before the date of filing the patent application and, secondly, an examination of the patent application by a patent examiner in view of relevant prior art to establish conformity with the local patent law system. Finally most patent systems provide the possibility to appeal a refusal of a patent application or for third parties to oppose a granted patent.

The international procedure of filing a patent application at the World Intellectual Property Organization (WIPO) is usually followed by entering the regional (e.g. EU) and/or national (e.g JP or US) patent system. The procedure for filing an international and European patent application before the European Patent Office will be used to illustrate the general principles of filing a patent application.

IWP26

The procedure to obtain the grant of a European patent

Rafaël H.L. Kiebooms,[1]
1)European Patent Office, The Netherlands
Patentlaan 2-9, 2288EE Rijswijk, The Netherlands, rkiebooms@epo.org

Introduction
he European patent grant procedure is an examination procedure beginning with a formalities examination and a mandatory search. The first stage ends with the publication of the European patent application and the search report. At the applicant's request this is followed by the second stage, substantive examination. After the patent has been granted, there may be a further procedure in the form of opposition proceedings or, upon request of the patentee, limitation or revocation proceedings.

The search report
On receiving an application the European Patent Office (EPO) examines whether it can be accorded a date of filing. This is the case if the application documents contain: an indication that a European patent is sought; information identifying the applicant; a description or a reference to a previously filed application. If the application has been accorded a date of filing and is not deemed to be withdrawn, the Receiving Section checks for compliance with the provisions governing translations, the content of the Request for Grant, the presence of claims, the filing of the abstract, representation, formal requirements, any priority claimed, designation of the inventor and the filing of any drawings.
While the formalities examination is in progress, the European search is performed. The search report is drawn up on the basis of the claims, with due regard to the description and any drawings. It mentions the documents available to the EPO when it is drawn up which may be taken into consideration in assessing novelty and inventive step. The search report is accompanied by an opinion on whether the application and the invention to which it relates meet the requirements of the European Patent Convention (EPC). The non-binding opinion is not published together with the search report but is available to the public by way of file inspection after publication of the application.

Substantive Examination
Once the request for examination has been filed, the EPO examines, in the light of the search report and the applicant's response to it, whether the application and the invention to which it relates meet the requirements of the Convention, and in particular whether the invention is patentable. If the application and the invention to which it relates meet the requirements of the Convention, the examining division will decide to grant a European patent provided that the requisite fees have been paid in due time and a translation of the claims into the other two official languages of the EPO has been filed in due time. The grant does not take effect until the date on which it is mentioned in the European Patent Bulletin. At the same time as it publishes this mention, the EPO publishes a European patent specification containing the description, the claims and any drawings. The European Patent Bulletin is published electronically on the EPO's publication server (www.epo.org).

Opposition and Appeal
Up to nine months after publication of the mention that a European patent has been granted, anyone may give the EPO notice of opposition to the patent. As a result of the examination of the opposition the opposition can be rejected, or the patent can be maintained in amended form or be revoked.
Appeals may be filed against decisions of the Receiving Section, the examining divisions, the opposition divisions and the Legal Division. An appeal has suspensive effect, which means that the contested decision is not yet final (no formal res judicata) and its effects are suspended.

References
'How to get a European patent - Guide for applicants', European Patent Office (2010)

IWP27

The seven deadly sins of the inventor

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1)European Patent Office, The Netherlands
Patentlaan 2-9, 2288EE Rijswijk, The Netherlands, rkiebooms@epo.org

Introduction
There are many reasons why the application for the grant of a patent may not be successful. Even when a patent has been granted, the utilization of the patent may not provide the anticipated results.

Holistic intellectual property stragey
Obtaining a patent should be seen as one of the many pieces of a holistic Intellectual Property strategy. An appropriate Intellectual Property strategy should consider the position of the organization in its socio-economic ecosystem, the various possibilities to acquire intellectual property rights and finally how to benefit form the utilization of the so-acquired intellectual property rights.
Establishing such a holistic strategy requires the close collaboration of experts not only in research and development, but also in marketing, management as well as the involvement of specialists in the different intellectual property rights around the globe.

Seven deadly sins
There are many pitfalls during the acquisition of intellectual property rights such as patents but also copyrights, design rights and trade marks. Among the many pitfalls, we highlight seven of some of the common issues that may either not yield a patent or lead to unsatisfactory utilization results. For an audience with a scientific background, these issues are discussed in view of patents as a more pertinent intellectual property right:

1. The invention is more complex than the problem merits
2. The invention is not kept secret until the date of filing
3. The invention is not new
4. The inventor has not fully considered the problem
5. No one is interested in the invention
6. An invention is not 'safer' when kept secret
7. The inventor has an unrealistic idea of his invention

IWP28

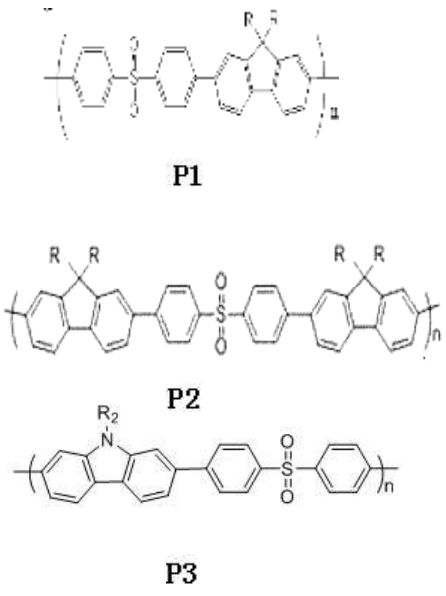
Microbiology

How does bacteria distinguish different luanguages?

Hiroko SHIMAMURA[U,1], Masanori TOYOFUKU[2], Tomohiro MOROHOSHI[3], Tsukasa IKEDA[3], and Nobuhiko NOMURA[2]
[1]College of Agrobiological Resource Sciences, University of Tsukuba
[2] Faculty of life and Environmental Sciences, University of Tsukuba
[3]Department of Material and Environmental Chemistry, Utsunomiya University. [U]undergraduate
E-mail: s1110666@u.tsukuba.ac.jp (H Shimamura)

Chromobacterium violaceum can receive various signal compounds, but we don't know what system the bacterium has. Here, we analyzed it.

IWP29



New D-π-A type polymer

Synthesis and Characterization of Polymers Having Sulfone Unit for Blue Electroluminescence

ZhongMin Geng,[1,2] Masashi Kijima[2,3]
1) Graduate School of Pure and Applied Sciences, University of Tsukuba, 2) TIMS,
3) Faculty of Pure and Applied Sciences, University of Tsukuba,
s-geng@ims.tsukuba.ac.jp (Z,M.Geng)

New donor-π-acceptor type polymers consisted of carbazole/fluorene as an electron-donating moiety and sulfone as an electron-accepting moiety were synthesized. The PL spectra of P1, P2, and P3 were measured. Their CIE (*x*, *y*) values in the film state were (0.16, 0.08), (0.15, 0.06), and (0.16, 0.11), respectively, which suggest that they emit deep blue.

IWP30

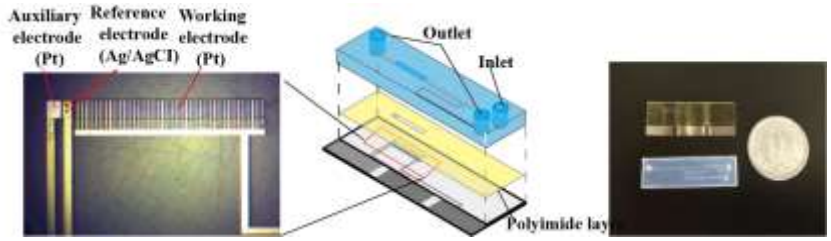
Electrochemistry

Coulometric microdevice for organophosphate pesticide detection

Jin Wang [1], Hiroaki Suzuki [2], Takaaki Satake [1,]

[1] *Graduate School of Life and Environmental Sciences, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki 305-8572, Japan*

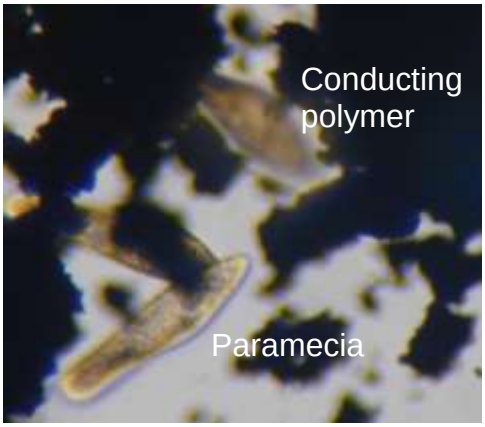
[2] *Graduate School of Pure and Applied Sciences, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki 305-8573, Japan*



As a liquid screening technology to detect the residual pesticide of fresh fruits and vegetable, a coulometric microdevice based on plug-based microfluidics was developed for organophosphate pesticide (OP) detection. The detection was based on the inhibition of acetylcholinesterase (AChE) by the OP. Changes in the enzyme activity was measured by coulometry. Hydrogen peroxide (H_2O_2) produced in a series of enzymatic reactions of AChE and choline oxidase (ChOx) was recorded on the working microelectrode. A linear relationship was confirmed between the generated charge and OP concentration. This coulometric microdevice successfully provides lower limit of detection (LOD) of 33 nM and 90 nM with low-cost in consuming very expensive reagents, acceptable actuate and promising detection of OP from commercial formulations.

Keywords: coulometry, organophosphate pesticide, liquid plug, acetylcholinesterase, choline oxidase

IWP31



Conjugation of Biology and Polymer Chem

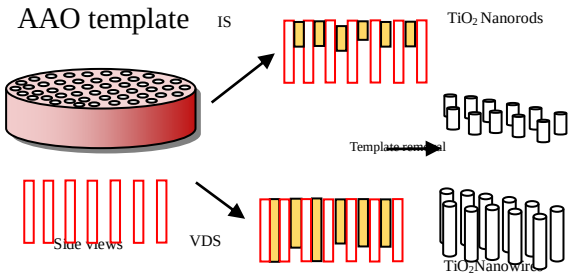
New Culture Method of Paramecium in the Presence of Conducting Polymers

Hiromasa Goto
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
E-mail: gotoh@ims.tsukuba.ac.jp

Polyaniline is employed for cultivation of paramecium.

IWP32

Toward Highly Efficient Solar Cells

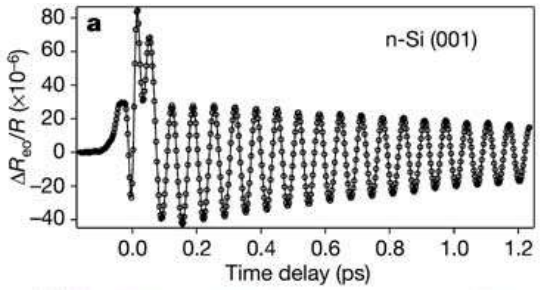


Methodology to control diameter and ordered-structure applied in DSSC

Methawee Nukunudompanich[1,2] and Yoshikazu Suzuki[1]
[1]Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
[2]The Joint Graduate School of Energy and Environment (JGSEE), King Mongkut's University of Technology Thonburi
E-mail:methawee.nukun@mail.kmutt.ac.th

AAO-template is used to achieve uniformly ordered nanostructure with controlled diameter and length.

IWP33



M.Hase, et. al. Nature 426, 51-54 (6 November 2003)

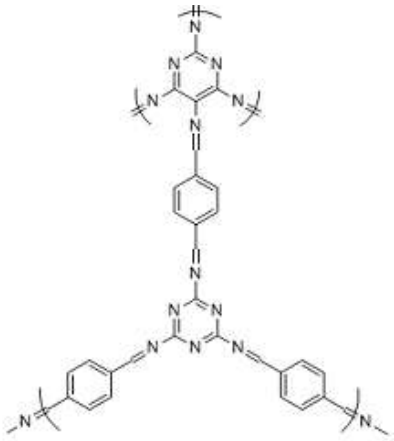
Optical Properties of Semiconductors

Theoretical Study of Coherent Phonon Generation Accompanying Quantum Effects

Yohei Watanabe,* Yuya Nemoto,
Ken-ichi Hino, Nobuya Maeshima
*Graduate School of Pure and Applied Sciences, University of Tsukuba
*E-mail: s1320476@u.tsukuba.ac.jp

We study the mechanism of coherent phonon generation based on the polaronic quasiparticle picture.

IWP34



N-Enriched Carbon Materials

Characterization of Nitrogen Enriched Carbon Materials Prepared by Pyrolysis of Melamine Based Polymers

Kazuya YAMADA[1,2], Masashi KIJIMA[2,3]
[1] College of Engineering Sciences, University of Tsukuba [2] (TIMS) [3] Faculty of Pure and applied Sciences, University of Tsukuba
[U]undergraduate
E-mail: s-yamada@ims.tsukuba.ac.jp

This study is intended to prepare electroactive carbon materials having high specific surface area and high nitrogen content for high performance capacitor. The N-enriched carbons were prepared by carbonization of melamine based polymers under various conditions, and the carbonized samples were characterized by N_2 adsorption method.

IWP35

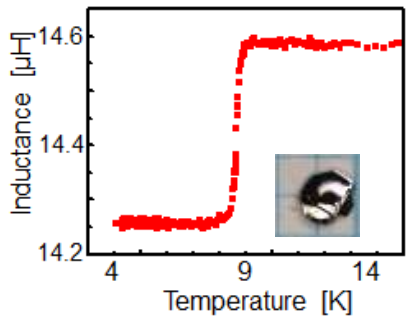


Fig. 1. Temperature dependence of magnetic response of FeSe, exhibiting the Miessner effect at about 9 K. The inset shows a photograph of the FeSe single crystal with a lateral size of 1×1

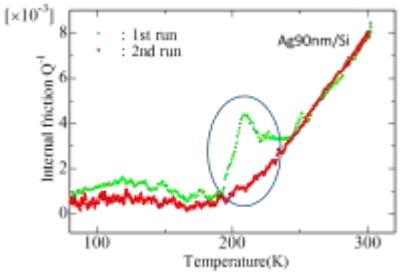
Physics

Single crystal growth and characterization of superconducting FeSe

K, Terao,[1] T. Kashiwagi,[1]Y. Suzuki,[1] Y. Arakawa,[1] M. Komatsu,[1] F. Kimizuka,[1]T. Enomoto,[1] Y. Mizuno,[1] K. Ohara,[1] K. Kadowaki,[1] [1]University of Tsukuba
E-mail: s-terao@ims.tsukuba.ac.jp

Single crystals of FeSe have successfully been grown by the flux and CVT methods with $AlCl_3$-KCl as flux. The quality of single crystalline FeSe was examined by transport and magnetic properties measurements.

IWP36



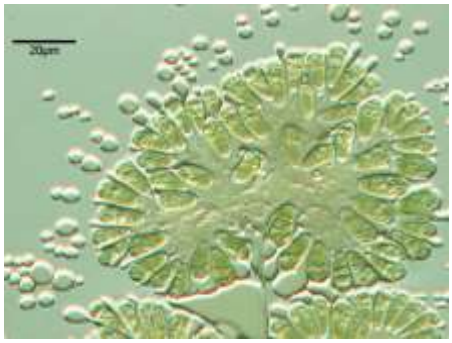
Metallic Nano Materials

Anomalous internal friction peak of ultra-thin Ag film at around 200K.

Kento Inoda and Hisanori Tanimoto
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba
Tennodai 1-1-1, Tsukuba, Ibaraki 305-8573, Japan
E-mail:s-inoda@ims.tsukuba.ac.jp

An anomalous large internal friction peak is observed for nm-thick silver thin films only during the first warm-up run after exposure to air. It indicates that absorption and desorption of gaseous materials at the surface or interfaces are responsible for the anomalous large internal friction peak.

IWP37



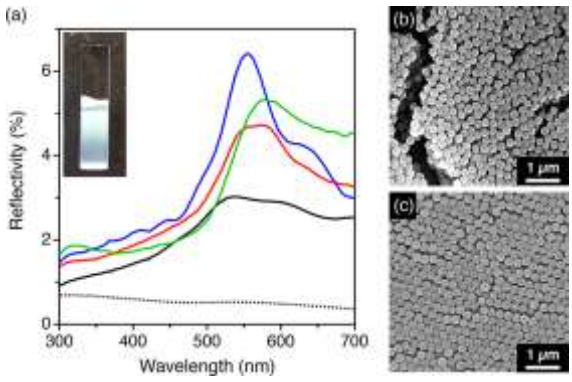
Production of Oils by Microbes

Mass cultivation of oil producing microalgae Botryococcus braunii.

Mikihide DEMURA,[1,*] Makoto M. Watanabe,[1]
[1]Faculty of Life and Environmental Sciences, University of Tsukuba
E-mail: demura.mikihide.fw@u.tsukuba.ac.jp

We studied mass cultivation of oil-producing microalgae *Botryococcus braunii* in outdoor raceway pond.

IWP38



Ferroelectric Polymer Colliods

β-phase transformation of poly(vinylidene fluoride) and their colloidal crystallization

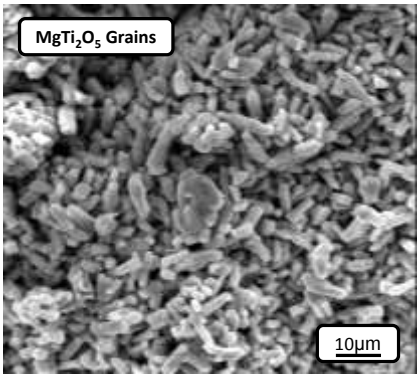
Daichi Okada,[1] Yohei Yamamoto[1,2]
[1]*Division of Materials Science*, [2]*TIMS, Faculty of Pure and Applied Sciences, University of Tsukuba*
E-mail: s-okada@ims.tsukuba.ac.jp

We fabricated colloidal crystals from ferroelectric polymer PVDF, which was characterized by SEM and reflectance spectra.

IWP39

Water purification filter for developing country

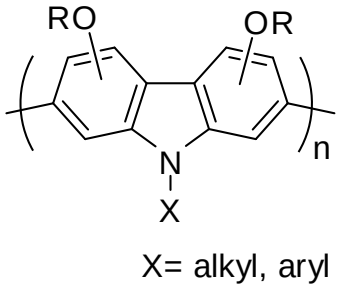
Preparation and microstructural observation of $MgTi_2O_5$ with pseudobrookite-type structure



Yuta Nakagoshi, Yoshikazu Suzuki
College of Engineering Sciences, School of Science and Engineering, University of Tsukuba.
E-mail: s-nakagoshi@ims.tsukuba.ac.jp

Grain morphology of $MgTi_2O_5$ strongly depends on sintering conditions and mineralizer.

IWP40



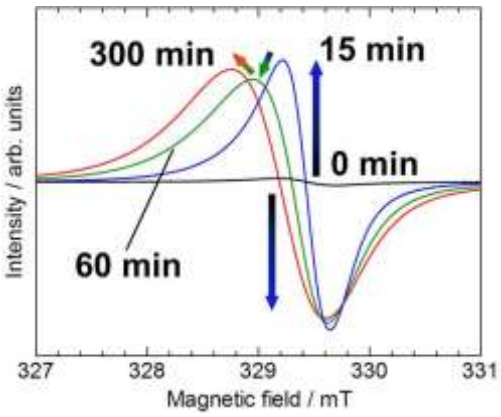
Light Emitting Polymer

Molecular Design of Alkoxy Substituted Poly(2,7-carbazole)s for Blue-Light Emitting Diode

Shinnosuke Okabe,[1,2,U] Masashi Kijima,[2,3]
[1] College of Engineering Sciences, University of Tsukuba, [2] TIMS, [3] Faculty of pure and Applied Sciences, University of Tsukuba, [U] Undergraduate
E-mail: s-okabe@ims.tsukuba.ac.jp

Alkoxy substituent was introduced at 3,6-positions of poly(2,7-carbazole) to improve stability of blue emission of organic light emitting diode (OLED). The polymer showed blue fluorescence but the quantum yield was very low. It is thought that the polymer easily reacts with oxygen because of a shallow HOMO level of the polymer. Therefore, HOMO levels and charge distributions of a series of polycarbazoles introduced alkoxy group are calculated by density functionary theory, and compared each other. It is considered that reducing the charge at nitrogen is a strategy of design this type of polymer for blue OLED.

IWP41



Conjugated Polymers

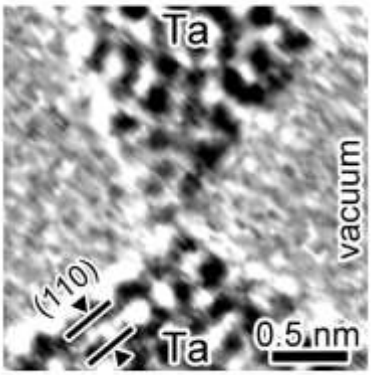
Magnetic and Oprical Properties of Conjugated Polymers Bearing Conjugated Side Chains

Hirotsugu Kawashima,[1] Norio Ota,[1] Takeshi Yasuda,[2] Hiromasa Goto[1,*]
[1]University of Tsukuba, [2]National Institute for Materials Science (NIMS)
E-mail: gotoh@ims.tsukuba.ac.jp

π-Conjugated polymers containing phenylene- vinylene units in both the main chain and the side chains exhibit unique magnetic and optical behaviors. Mechanisms of these characteristics are proposed in this paper.

IWP42

The Production of Metallic Nanowires



Structure and Conductance of Atomic-Sized Tantalum Contacts

Satoshi Murata and Tokushi Kizuka
Division of Materials Science, Univ. of Tsukuba.
E-mail: kizlab@ims.tsukuba.ac.jp

Two tantalum nanotips were brought into contact to produce a contact inside a transmission electron microscope. The structure was observed and conductance was measured simultaneously.

IWP43

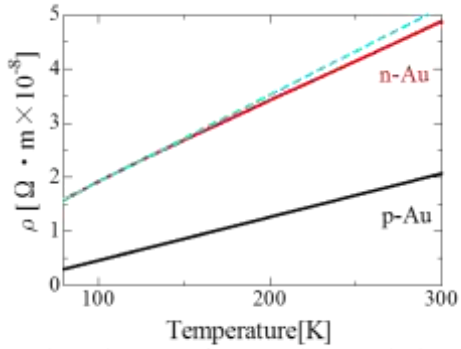


Fig.1 Electrical resistivity of nanocrystalline Au and polycrystalline Au in the temperature range of 140-300K

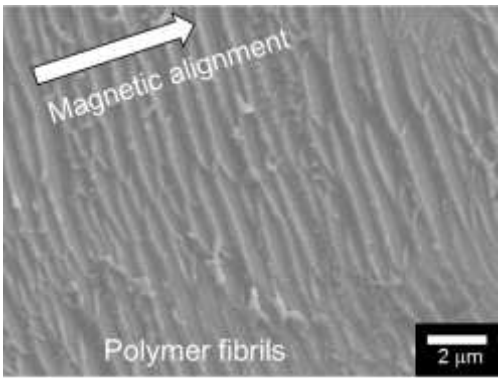
Metallic Nano-materials

Characteristic Grain Boundary State of Nanocrystalline Gold

Takahiro Sato, Kosuke Suzuki, Hisanori Tanimoto
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
E-mail: s-satoh@ims.tsukuba.ac.jp

The characteristic grain boundary state of nanocrystalline gold (n-Au) is investigated from electric, thermal and mechanical properties which are different from those of conventional polycrystalline gold (p-Au) at low temperatures.

IWP44



Polymer Thin Films

Electrochemical Synthesis of High Anisotropic Polymer Films in Magnetically Aligned Smectic Liquid Crystal

Hiroki HAYASHI[1], Kosuke KAWABATA[1], Shigeki NIMORI[2], and Hiromasa GOTO[1]
[1]Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba
[2] National Institute for Materials Science
E-mail: gotoh@ims.tsukuba.ac.jp

A magnetically aligned smectic liquid crystal as solvent is employed for high anisotropic polymer films.

IWP45

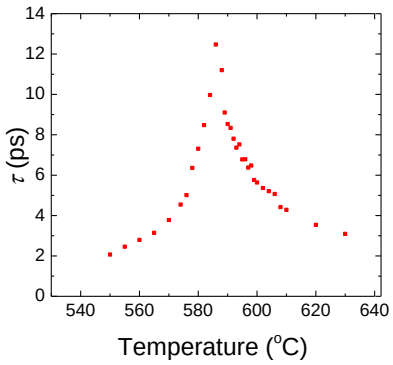


Fig. 1 Critical slowing down near T_C.

Ferroelectric Materials

Critical slowing down of ferroelectric $Ba_2NaNb_5O_{15}$ studied by broadband Brillouin spectroscopy

U,[1]Yohanes Christy, [2]Kazuya Matsumoto, and [2]Seiji Kojima
[1]School of Engineering Sciences, [2]Graduate School of Pure and Applied Sciences, University of Tsukuba
E-mail: s1313069@u.tsukuba.ac.jp

Succesive phase transitions of $Ba_2NaNb_5O_{15}$ were studied using Brillouin spectroscopy. The behavior of LA, TA, and Central peak in the vicinity of the Curie temperature, T_C = 585℃, and the thermal hysteresis near the incommensurate transition temperature, T_{IC} = 285℃ were observed clearly.

IWP46

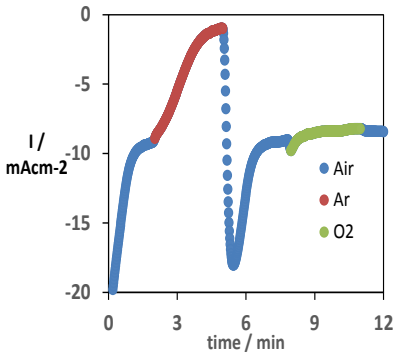


Fig. chronoamperometric measurement of carbon electrode absorbing BOD and ferricyanide under various gases.

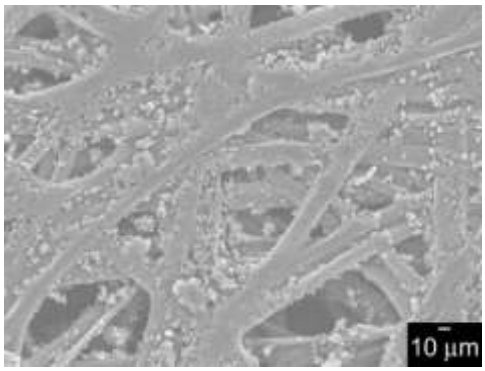
Bioelectrochemistry

Evaluation of stability and high current cathode of biofuel cell utilizing bilirubin oxidase and ferricyanide.

Ryo Ainai,[1] Seiya Tsujimura,[1,*]
[1]Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
E-mail: s1420389@u.tsukuba.ac.jp

We studied cathode of enzymatic fuel cells. Enzymatic fuel cells utilize redox property of enzyme. Bilirubin oxidase and ferricyanide are used as enzyme and mediator, respectively, and immobilized on carbon electrode. This electrode achieved 10mA/cm^2 after 5h chronoamperometric measurement.

IWP47



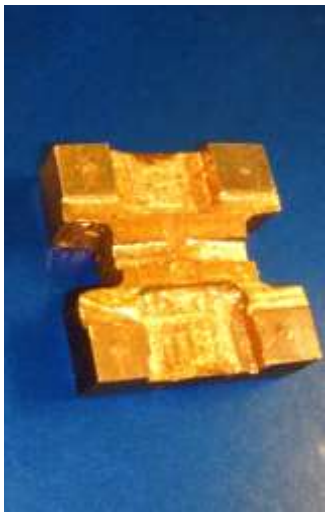
Fiber Material

Synthesis and Characterization of Conductive Cocoon

Yuki Kaitsuka, Hiromasa Goto
Division of Materials Science, Faculty of Pure and Applied Sciences,University of Tsukuba
E-mail: gotoh@ims.tsukuba.ac.jp (H. Goto)

We synthesized polyaniline/cocoon composites in the presence of (+)-camphor sulfonic acid (CSA).

IWP48



Material Science

Development of High Power THz Oscillator by Using High Temperature Superconductor

T. Katsuragawa, H. Minami, Y. Saiwai,
T. Kitamura, C. Watanabe K. Asanuma,
T. Yasui, K. Nakade, Y. Shibano,
K. Sakamoto, H. Kubo, T. Yamamoto,
T. Kashiwagi, K. Kadowaki
Applied condensed Matter Physics, Engineering Sciences, University of Tsukuba, NIMS[A]
E-mail: s-katsuragawa@ims.tsukuba.ac.jp

We developed a new THz oscillator based on a high-T_c superconductor $Bi_2Sr_2CaCu_2O_{8+\delta}$ which has a better heat conducting mechanism using a copper.

IWP49

Photosynthesis

Structuer of P740 based on the absorption spectrum and redox potential

Daisuke Fukayama[1], Tatsuya Iemura[1], Hideaki Miyashita[2], Koji Iwamoto[3], Yoshihiro Shiraiwa[3], Tadashi Watanabe[4], Masami Kobayashi[1]
[1]Division of Materials Science, Faculty of Pure and Applied Science, University of Tsukuba
[2]Graduate School of Human and Environment Studies, Kyoto University
[3]Faculty of Life and Environmental Sciences, University of Tsukuba, Japan
[4]Research Center for Math and Science Education, Organization for Advanced Education, Tokyo University of Science
E-mail: s-fuka@ims.tsukuba.ac.jp

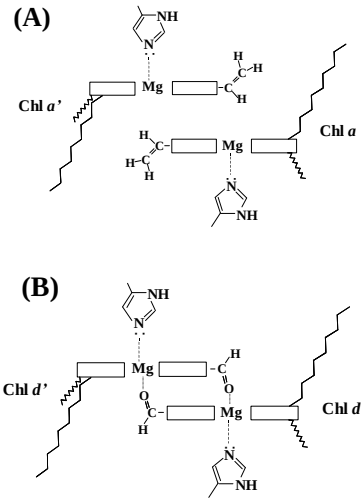
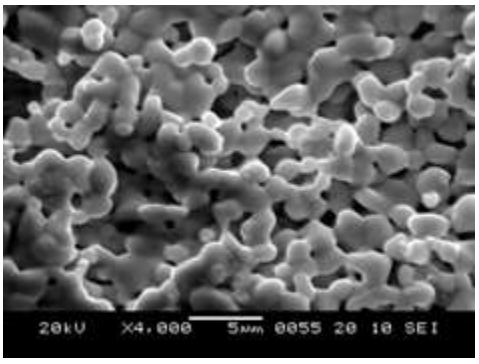


Fig. 1 (A)P700 and (B) a proposed model of P740 in *A. marina*

P740, the primary electron donor of PS Ⅰ in *Acaryochloris marina* is a Chl *d/d'* heterodimer, while P700 is a heterodimer of Chl *a/a'*(Fig. 1). The molecular structure of P740 was proposed based on the absorption spectrum and the redox potentials compared with those of a Chl *a/a'* heterodimer of P700. The interaction between the special pair chlorophylls, Chl *d* and *d'*, of P740 might be stronger than that between Chl *a* and *a'* of P700.

IWP50



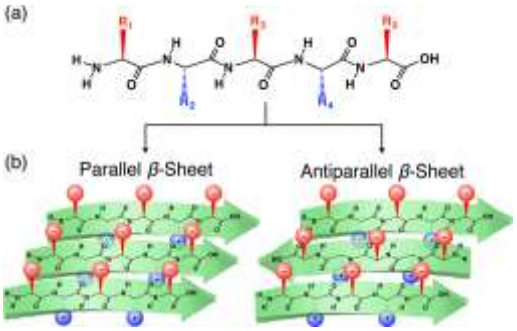
Lead-free ceramics

Density change and piezoelectric property of $LiNbO_3$ via reactive sintering

Takayuki Okano and Yoshikazu Suzuki
College of Engineering Sciences, School of Science and Engineering, University of Tsukuba.
E-mail: s-okano@ims.tsukuba.ac.jp

Relative density depends on sintering rate and temperature.

IWP51



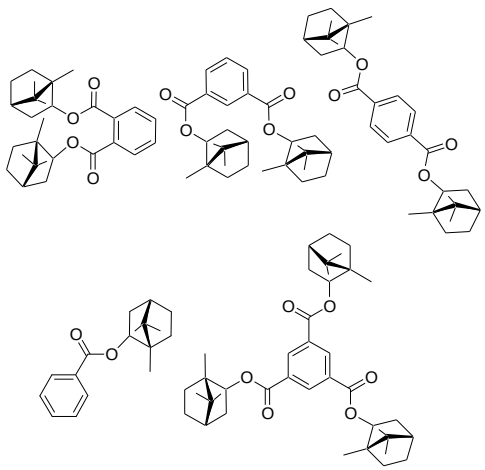
Peptide Assembly

Metal-Coordinated Peptide β-Sheet Assembly

Tsukasa Mizutaru[U1], Toru Nakayama[2], Taro Sakuraba[2], and Yohei Yamamoto[2,3]
[1]College of Science Engineering [2]Faculty of Pure and Applied Sci., [3]TIMS, Univ. of Tsukuba
E-mail: s-mizutaru@ims.tsukuba.ac.jp

We synthesized Fmoc-pentapeptides having Histidine or Cysteine as metal binding sites and investigated their assembling behaviors in methanol.

IWP52



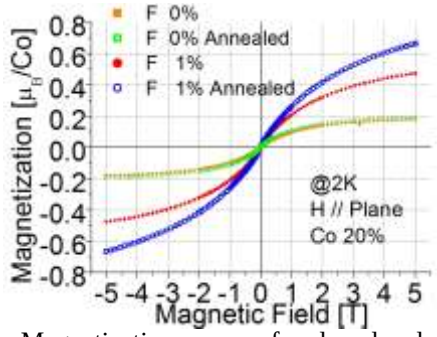
Electrochemical polymerization

Synthesis of borneol-containing Chiral Inducers and Optically Active Poly(3,4-ethylenedioxythio-phene).

Atsushi Matsumura, Fan Yang and Hiromasa Goto*
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
E-mail: gotoh@ims.tsukuba.ac.jp

We studied borneol-containing chiral inducers and optically active poly(3,4-ethylenedioxythio-phene) (PEDOT).

IWP53



Magnetization curves of undoped and F-doped thin films of (Zn,Co)O with 20% of Co.The annealing was performed at 500°C.

Semiconductor spintronics

The effect of F-doping on magnetism in diluted magnetic semiconductor (Zn,Co)O thin films.

Ryo Ishikawa,[1] Ryota Akiyama,[1] Shinji Kuroda[1,*]
[1]Grad. School of Pure &Appl. Sci. Univ. Tsukuba
E-mail: s-ishikawa@ims.tsukuba.ac.jp

DMSs are considered to be indispensable for the application in spintronics. For the device application, the synthesis of DMSs having a ferromagnetic transition temperature higher than room temperature is required. We studied the effect of fluorine doping on the magnetism of (Zn,Co)O.

IWP54

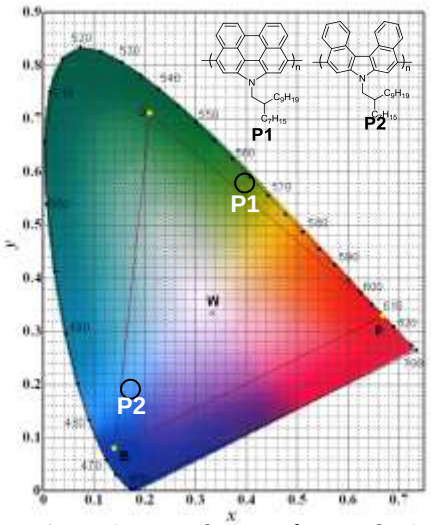


Fig. 1 CIE coordinates of **P1** and **P2**. These values were estimated from PL spectra of **P1** and **P2** in the film states.

Light Emitting Polymers

Synthesis and Optical Characteristics of Poly(phenanthrocarbazole)

Tomohiro Okura,[1] and Masashi Kijima,[2,3]
[1]Inst. Mater. Sci. Grad. School Pure & Appl., U. Tsukuba, [2] TIMS,
[3]Div. Mater. Sci. Facul. Pure & Appl. Sci., U. Tsukuba
E-mail: s-okura@ims.tsukuba.ac.jp

Poly(phenanthrocarbazole) (**P1**) was synthesized for use as an emitting layer material with high color stability in organic light emitting diodes. Optical properties were investigated and compared with those of poly(dibenzocarbazole) (**P2**) that has an analogous skeleton to **P1**.

IWP55

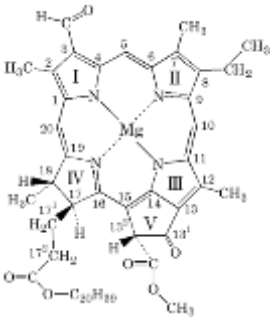
Polymerization in liquid crystals

Electrochemical polymerization in cholesteric liquid crystal by using a novel chiral dopant.

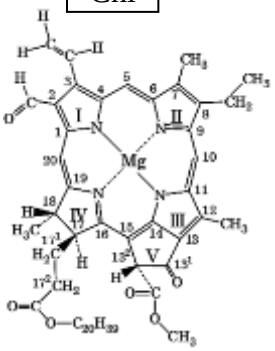
Jiuchao Dong, Kohsuke Kawabata, Hiromasa Goto*
Graduate School of Pure and Applied Sciences, Institute of Material Science, University of Tsukuba. E-mail: gotoh@ims.tsukuba.ac.jp

Electrochemical polymerization in cholesteric liquid crystal by using a novel chiral dopant was carried out.

IWP56



Chl



Chl *f*

Photosynthesys

Detection of Chls *d* and *f* in processed foods

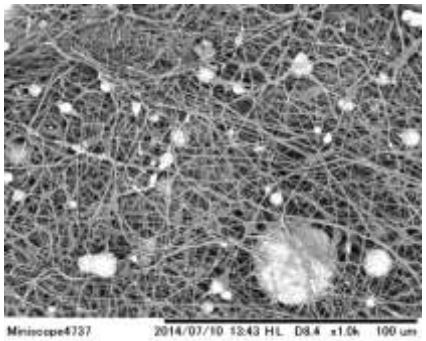
Kanako Kimura[1], Daiki Fujinuma[1], Shinya Akutsu[1], Hideaki Miyashita[2], Masami Kobayashi[1]
[1]Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba
[2]Graduate School of Human and Environmental Studies, Kyoto University.
E-mail: s-kana@ims.tsukuba.ac.jp

A Chl *d*-dominated cyanobacterium, *Acaryochloris marina*, was discovered in 1993, but biosynthetic pathway of Chl *d* has not yet been clarified. In 2010, a red-shifted chlorophyll was discovered in a methanolic extract of Shark Bay stromatolites, and was named Chl *f*. In 2011, Chl *f* was also discovered in a unicellular cyanobacterium isolated from Lake Biwa, but Chl *f* was detected only when the cyanobacterium was cultivated under near infrared light. In order to clarify the birth of Chls *d and f* in nature, we analysed pigments in processed vegetable foods: Chl *d* was detected as a minor pigment in green juice, laver, green tea, powdery parsley and basil. Chl *f* and Phe *f* were also detected in several green juice, tea and laver, while the amount was smaller than Chl *d*, suggesting the Chl *a* → Chl *f* conversion is a little difficult than the Chl *a* → Chl *d* conversion. Our finding indicates that the conversions from Chl *a* into Chls *d* and *f* are not a rare event in nature, and will provide new insight into the unsolved question as to the birth of Chls *d* and *f* in natural photosynthesis.

IWP57

Ceramics and Organic hybrid

SEM observations of electrospun $BaTiO_3$ and PVA composite fibers



Tasuku Kawashima, Ryosuke Maki, and Yoshikazu Suzuki
Graduate school of Pure and Applied Sciences, University of Tsukuba.
E-mail: s-kawashima@ims.tsukuba.ac.jp

Electrospinning is the method of making polymer fibers. We applied this method for making ceramics/polymer composite fibers.

IWP58

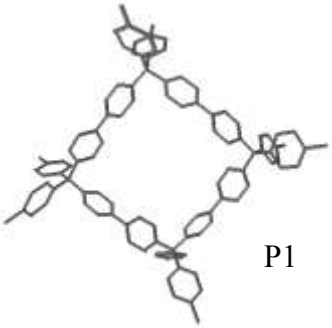
Liquid Crystal and Polymer Technology

Synthesis and Properties of Chiral Inducer of Liquid Crystal Using Isoleucine

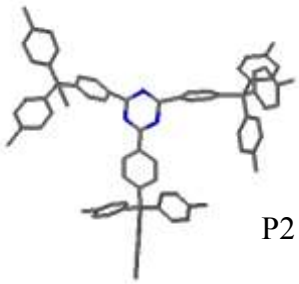
Tomoaki Jo[1], Jiuchao Dong[1], Aohan Wang[1], Hiromasa Goto,[1,*]
[1]Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba
E-mail: gotoh@ims.tsukuba.ac.jp

We synthesized a novel chiral inducer. The mixture of inducer and 6CB which show nematic liquid crystal get cholesteric liquid crystal.

IWP59



P1



P2

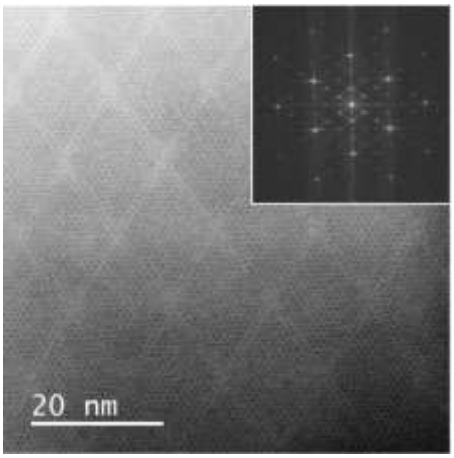
Porous Materials

Carbonization of Covalent Organic Frameworks Composed of a Tetraphenylmethane Unit

Yasuyuki Kimura,[1,2] Masashi Kijima,[2,3]
[1] Grad School Pure. & Appl. Sci. U. Tsukuba, [2] TIMS, [3] Fac. Pure & Appl. Sci. Univ. Tsukuba
E-mail: s-y.kimura@ims.tsukuba.ac.jp

Two kinds of microporous 3D organic frameworks (P1 and P2) were prepared by polycondensation of tetrakis(4-bromophenyl)methane and poly(cycloaddition) of tetrakis(4-cyanophenyl)methane, respectively. It is attempted to convert these microporous polymers into porous carbonized materials with reflecting the frameworks under various conditions.

IWP60



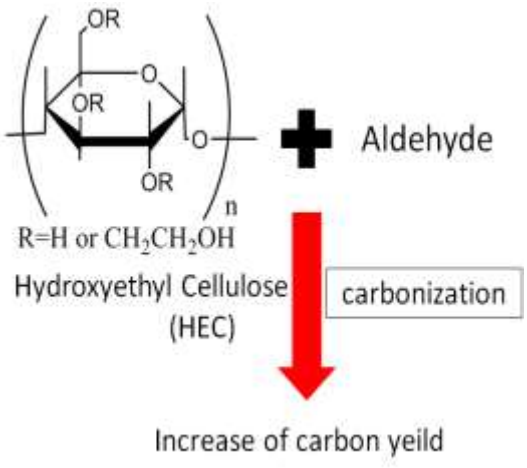
Advanced Inorganic Materials

Synthesis and Microstructure of Murataite-based Ceramics Obtained by Reactive Sintering

Ryosuke Maki[1], Haruta Mitsutaka[2], Hiroki Kurata[2], Yoshikazu Suzuki[1]
[1]Graduate School of Pure and Applied Sciences, University of Tsukuba
[2] Institute for Chemical Research, Kyoto University
E-mail: s-maki@ims.tsukuba.ac.jp

Superlattice structure of murataite ceramics was successfully observed by STEM.

IWP61



Carbonization of Woody Materials

Effect of Aldehyde Additives on Carbonization of Hydroxyethyl Cellulose

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Effect of aldehyde additives on carbonization of hydroxyethyl cellulose was investigated by thermal and spectroscopic analyses.

IWP62

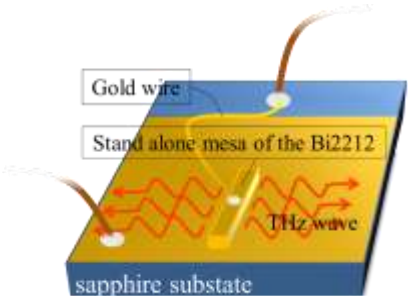

Fig1: Structure of the stand-alone type mesa.

Material science

Development of the THz radiation device made of a Bi2212 high T_c superconductor

K. Sakamoto,[1] T. Kashiwagi,[1] T. Kitamura,[1] K. Nakade,[1] K. Asanuma,[1] T. Yasui,[1] Y. Saiwai,[1] Y. Shibano,[1] H. Kubo,[1] T. Yamamoto,[2] H. Minami,[1] and K. Kadowaki[1]
[1]University of Tsukuba, [2]NIMS
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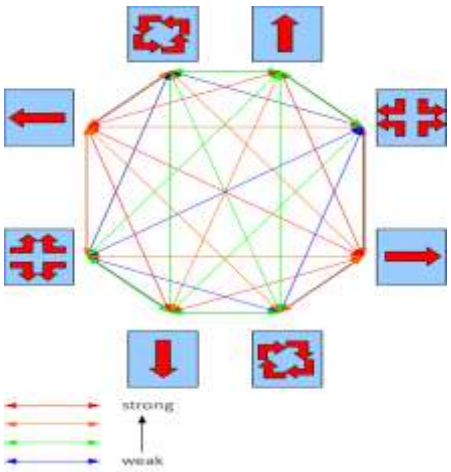
In order to make high performance THz radiation device from high T_c superconductor $Bi_2Sr_2CaCu_2O_{8+\delta}$. We have tried to improve the device and detailed construction of the mesa structure.

IWP63



Quantum Computer

Transition Electric dipole moment of Spin Vortex Induced Loop Current

Hikaru Wakaura,[1,2] Akira Okazaki,[1] Hiroyasu Koizumi,[1]
[1]Tsukuba.U. ,Department of Pure and Applied Material Science, [2] Affiliation
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Left picture shows the strength of dipole transition moment between 8 stable state of Spin Vortex Quartet. The strength of dipole transition moment varies for current shape. So I will tell you for what kind of state the dipole moment become strong.

IWP64

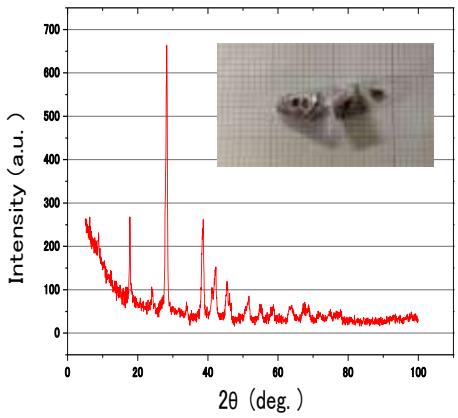

Fig. 1. XRD of Bi_2Te_2Se (powder)

Material Science

Single crystal growth of topological insulator Bi_2Te_2Se

Kotaro Ohara,[1] Yusuke Suzuki,[1] Yuki Arakawa,[1] Masashi Komatsu, [1]Fumiya Kimizuka,[1] Takuma Enomoto, [1] Kazuki Mizuno, [1] Kotaro Terao, [1] Takanari Kashiwagi, [1] Kazuo Kadowaki, [1]
[1]University of Tsukuba
E-mail: s-ohara@ims.tsukuba.ac.jp

Single crystal of Bi_2Te_2Se topological insulator have been grown as shown in Fig. 1. and the physical properties have been studied.

IWP65

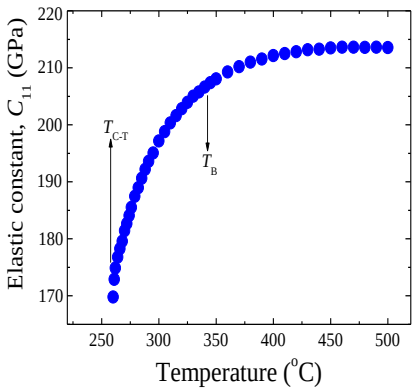

Fig.1 Temperature dependence of elastic constant, C_{11} of PMN-56PT.

Brillouin scattering

Brillouin scattering and *ab-initio* studies of the relaxor 44Pb($Mg_{1/2}Nb_{2/3}$)O_3-56$PbTiO_3$ single crystal

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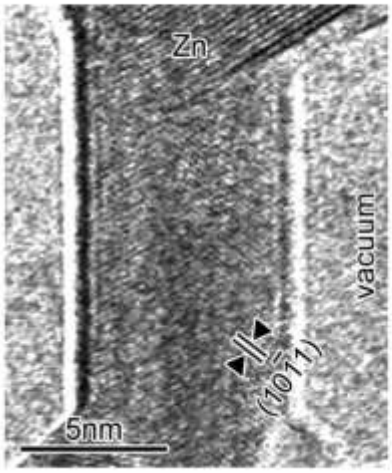
Graduate School of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8573, Japan.
E-mail: helalphy82@gmail.com

We report Brillouin scattering spectroscopy with the complete set of elastic constants obtained from *ab-initio* study in comparison on a 44Pb($Mg_{1/2}Nb_{2/3}$)O_3-56$PbTiO_3$ single crystal.

IWP66

The production of Metallic Nanowires



In Situ Transmission Electron Microscopy of Zinc Nanocontacts

Shin Ashida and Tokushi Kizuka
Division of Materials Science, Univ. of Tsukuba.
E-mail: kizlab@ims.tsukuba.ac.jp

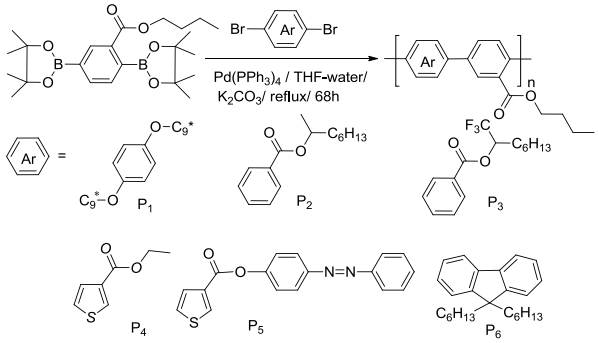
Two zinc nanocontacts were manipulated by piezodriving in a transmission electron microscope, resulting in the production of zinc nanowires. The process was *in situ* observed at the atomic scale.

IWP67

Synthesis of Conjugated Polymers

Synthesis of π-Conjugated Polymers Based on Benzoate Unit Prepared by Suzuki Coupling Method

Zhiyong Qin, Hiromasa Goto
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
E-mail: s-zyshin@ims.tsukuba.ac.jp



Scheme 1. Chemical structure of polymers.

We synthesized 6 novel polymers by the diborate of benzoate unit and the dibromo aromatic compound through Suzuki coupling reaction. Benzoate unit and aromatic compound substituted with functional groups that would show useful photoelectrical properties and endow themselves other chemical properties.

IWP68

Optical Properties of Semiconductors

Optical and Structural Properties of Organic-Inorganic Perovskite Semiconductors

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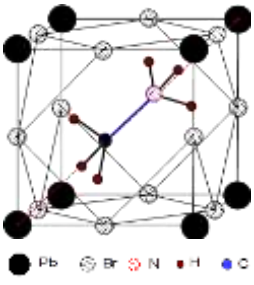
Division of Materials Science, Faculty of Pure and Applied Sciences,
University of Tsukuba ([U]undergraduate)
E-mail: suzuki@bunko2.bk.tsukuba.ac.jp



$(CH_3NH_3)PbBr_3$

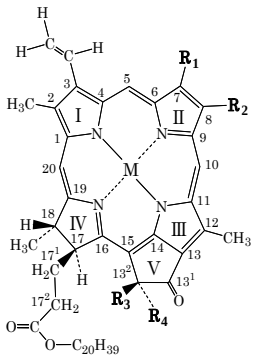
Lead-halide-based organic-inorganic perovskite semiconductors have recently drawn much attention in view point of both physics and optical application to a high-performance photovoltaic device. In this study, we investigate structural, optical and electronic properties of $(NH_2CH{=}NH_2)_x(CH_3NH_3)_{1-x}MX_3$ (M: Pb and Sn, X: Cl, Br and I) to elucidate the cause of its high conversion efficiency as a photovoltaic material as well as to provide a guiding principle for further improvement of the efficiency.

IWP69

Photosynthesis

Structural determination of DV-Chl *a*

Hirohisa Komatsu[1], Daiki Fujinuma[1], Shinya Akutsu[1], Daisuke Fukayama[1], Yuhta Sorimachi[1], Yuki Kato[2], Yoshinori Kuroiwa[2], Tadashi Watanabe[3], Hideaki Miyashita[4], Koji Iwamoto[5], Yoshihiro Shiraiwa[5], Mayumi Ohnishi-Kameyama[6], Hiroshi Ono[6], Hiroyuki Koike[7], Mayumi Sato[8], Masanobu Kawachi[8], Masami Kobayashi[1]
[1]Div. Materials Sci., Fac. Pure Appl. Sci. Univ. Tsukuba,[2] Inst. Industrial Sci., Univ. Tokyo, [3]Res. Center Math Sci. Edu., Org. Adv. Edu., Tokyo Univ. Sci., [4]Grad. School Human Environ. Studies, Kyoto Univ., [5]Fac. Life Environ. Sci., Univ. Tsukuba, [6]National Food Res. Inst., [7]Dept. Biol. Sci., Fac. Sci. Engin., Chuo Univ., [8]National Inst. Environ. Studies, Japan
E-mail: s-koma@ims.tsukuba.ac.jp



	M	R_1	R_2	R_3	R_4
Chl *a*	Mg	CH_3	CH_2CH_3	H	$COOCH_3$
Chl *a'*	Mg	CH_3	CH_2CH_3	$COOCH_3$	H
Phe *a*	2H	CH_3	CH_2CH_3	H	$COOCH_3$
Phe *a'*	2H	CH_3	CH_2CH_3	$COOCH_3$	H
DV-Chl *a*	Mg	CH_3	$CH=CH_2$	H	$COOCH_3$
DV-Chl *a'*	Mg	CH_3	$CH=CH_2$	$COOCH_3$	H
DV-Phe *a*	2H	CH_3	$CH=CH_2$	H	$COOCH_3$
DV-Phe *a'*	2H	CH_3	$CH=CH_2$	$COOCH_3$	H
DV-Chl *b*	Mg	CHO	$CH=CH_2$	H	$COOCH_3$

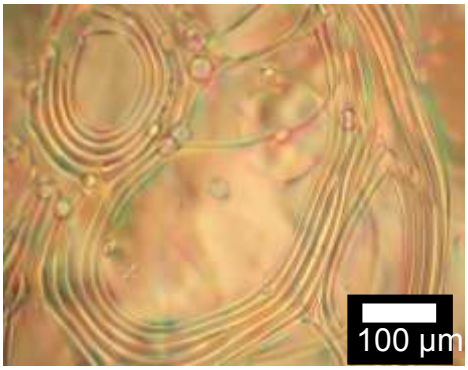
Fig. 1 Molecular structure and carbon numbering of chlorophylls, according to the IUPAC numbering system.

Precise physicochemical properties of divinyl chlorophylls were compared with those of monovinyl Chls. With simple isocratic eluent mode, DV- Chl *b* was clearly separated from MV- Chl *b* by a normal-phase HPLC, and pairs of DV- and MV-Chls *a, a'*, pheophytins *a* were also well separated by a reversed-phase HPLC. Absorption spectra of DV-Chls showed the red-shifted Soret band and the slightly reduced Q_Y band. The intensity of CD spectra of the DV-Chls were a little smaller. Precise mass and NMR spectra of DV- and MV-Chls were performed for the first time. The first oxidation and reduction potentials of DV-Chl *a* were clarified to be very slightly more positive than those of MV-Chl *a* by 8 mV and 10 mV, respectively.

IWP70

Polymerization in Liquid Crystal

Synthesis of Conjugated Polymer Film by Electrolytic Polymerization in Lyotropic Liquid Crystal



Naoto Eguchi[u1], Hiromasa Goto[2]
[1]College of Engineering Science, University of Tsukuba, [2]Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba
E-mail: gotoh@ims.tsukuba.ac.jp (H.Goto)

Molecular order of liquid crystal was transcribed in polymer film.

IWP71

Surface science

Positron diffraction experiments at the KEK Slow Positron Facility

I. Mochizuki[1], K. Wada[1], T. Hyodo[1], T. Shidara[1], Y. Fukaya[2], M. Maekawa[2], A. Kawasuso[2], and A. Ichimiya[3],
[1]KEK, [2]JAEA, [3]Nagoya Univ.
mochizu@post.kek.jp

A high-intensity mono-energetic positron beam generated by using a linear electron accelerator (linac) is used for total reflection high-energy positron diffraction (TRHEPD) researches at the Slow Positron Facility, KEK. In contrast to the electron, the potential energy of the positron inside a crystal is positive, and hence positrons incident on a crystal surface at a glancing angle smaller than a certain critical angle are totally reflected. On the total reflection conditions, practically all the positrons are reflected by the atoms that are exposed on the surface. This feature makes the TRHEPD a structure analysis tool sensitive to the topmost layer of the crystal surface.

We show the TRHEPD diffraction pattern from the Si(111)-(7×7) surface without background signals from the bulk, which is obtained at a glancing angle smaller than the critical angle for the total reflection. Details of the TRHEPD method and instrumentation are presented together with recent results of its application to structure analysis on the Pt/Ge(001) nano-wire surface, TiO_2(110)-(1×2) surface, and silicene on Ag(111) surface.

IWP72

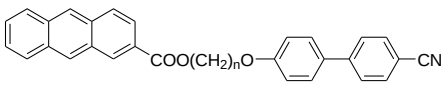


Fig. 1. Structure of anthracene compounds synthesized in this study.

Functional Organic Materials

Photoinduced Phase Change of Anthracene Compounds –Odd-Even Effect of Alkylene Spacer on Liquid Crystallinity and Phase Change Behavior–

Hideyuki Kihara,* Toshiaki Miura, Yukihiro Shimoi
Nanosystem Research Institute, National Institute of Advanced Industrial Science and Technology (AIST)
E-mail: h-kihara@aist.go.jp

We recently reported that anthracene compound with appropriate substituent (Fig. 1, *n* = 6) showed phase change behavior (between crystalline and amorphous) by the action of light. In this study, we synthesized analogous compounds (*n* = 2-10) and investigated their properties. Interestingly, it was found that anthracene compounds with odd numbers of *n* showed liquid-crystalline (LC) phase but not photoinduced phase change, in contrast, the compounds with even numbers of *n* exhibited photoinduced phase change but not LC phase.

IWP73

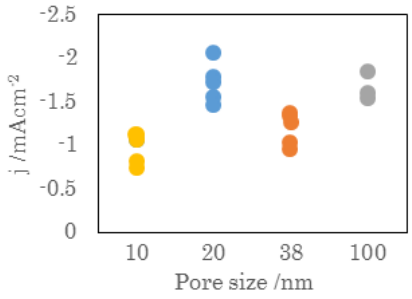


Fig. Pore-size dependence of the bilirubin oxidase-catalyzed O_2 reduction current density

Enzyme electrode reaction

Pore-size dependence of the enzyme electrode reaction in the mesopores.

Hiroto Funabashi[U,1], Kazuki Murata[2], Seiya Tsujimura[2]
[1]College of Engineering Sciences, School of Science and Engineering, University of Tsukuba,[U]undergraduate
[2]Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba.
E-mail: s1111040@u.tsukuba.ac.jp

We examine the pore size dependence of electrocatalytic activity of the adsorbed redox enzymes on the mesopores carbon.

IWP74

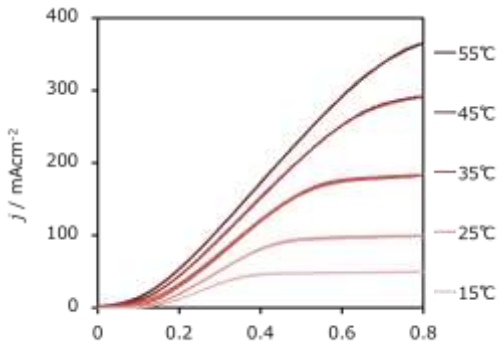


Fig. The temperature dependence of the catalytic current for glucose oxidation at pH 7

Porous carbon electrode

Exceptionally high glucose current on hierarchically strucutured porous carbon electrode with "wired" glucose dehydrogenase

Kazuki Murata,[1] Seiya Tsujimura[1]
Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba
E-mail: s1320468@u.tsukuba.ac.jp

We report enzymatic glucose oxidizing anode that exhibits high glucose electro-oxidation current and stability under neutral conditions.

IWP Flag was designed by Dr. Kiebooms.