

**20th International Symposium on
Boron, Borides and Related Materials
(ISBB 2019)**

Program

(Revised Version 2019/09/22)

September 22 (Sun) – 27 (Fri), 2019

“Toki Messe” (Niigata Convention Center)

Niigata City, Niigata, Japan

Schedule

	Day 1 Sept. 22 (Sun)	Day 2 Sept. 23 (Mon)	Day 3 Sept. 24 (Tue)
8:30		Registration	Registration
	8:45	Opening Remarks	
9:00		Focused Session I-01, 02, O-01	Physics I-09, 10, 11
10:00		Coffee	Coffee
11:00		Focused Session I-03, 04, 05	Physics I-12, 13, 14 O-05
12:00		Photo	
13:00		Lunch	Lunch
14:00		Focused Session I-06, O-02, 03	Physics I-15, 16, O-06
15:00		Coffee/ Poster P-01~16	Coffee/ Poster P-17~32, 49
16:00	Registration		
17:00		Chemistry I-07, 08, O-04	Preparation & New Mat. I-17, 18, 19
18:00	Welcome Reception		
19:00			

	Day 4 Sept. 25 (Wed)	Day 5 Sept. 26 (Thu)	Day 6 Sept. 27 (Fri)
8:30	Registration	Registration	Registration
9:00	Application I-20, O-07, 08	Chemistry, Application I-23	Structure I-27, O-22
10:00	Coffee	O-11, 12, 13	Coffee
11:00	Application I-21, 22 O-10	Coffee	Structure O-24, 25, 26
12:00	Lunch	Preparation & New Mat. I-24, 25 O-14, 15	Closing Remarks
13:00	Lunch	Lunch	
14:00	Excursion	Preparation & New Mat. I-26, O-16, 17	
15:00		Coffee/ Poster P-33~48	
16:00		Preparation & New Mat. O-18, 19, 20, 21	
17:00	Banquet		
18:00			
19:00			

Scientific Program

Oral Presentations

Day 2 Monday, Sept. 23

08:45 Opening Remarks

Focused Session (Session Chair: T. Kondo)

09:00 **I-01** B. I. Yakobson (Rice University) Towards 2-Dimensional Boron - Borophene, in Theory and in Practice
09:30 **I-02** K. Wu (Chinese Academy of Sciences) Tuning the Atomic and Electronic Structure of 2D Boron Sheets
10:00 **O-01** I. Matsuda (The University of Tokyo) Semi-metallicity of free-standing hydrogenated monolayer boron from MgB₂

10:20 – 10:40 Coffee Break

Focused Session (Session Chair: M. Niibe)

10:40 **I-03** J. Kunstmann (TU Dresden) Insights to the phase diagram of two-dimensional boron oxide and on hydrogenated alpha-tetragonal boron
11:10 **I-04** N. G. Szewacki (University of Warsaw) The structure of sparse 2D boron sheets
11:40 **I-05** S. Souma (Tohoku University) A topological perspective to electronic structure in metallic borides verified by angle-resolved photoelectron spectroscopy

12:10 Photo
12:30 – 14:00 Lunch

Focused Session (Session Chair: J. Kunstmann)

14:00 **I-06** T. Kondo (University of Tsukuba) Hydrogen Boride Sheets: Synthesis, Characterization, and Application
14:30 **O-02** K. Kimura (The University of Tokyo) Stability and Bonding Nature for Icosahedral or Planar Cluster of Hydrogenated Boron or Aluminum
14:50 **O-03** W. Hayami (National Institute for Materials Science) A graphene-MXene complex compound and graphite-like BC₂

15:10 – 16:50 Coffee / Poster Session (P-01 ~ P-16)

Chemistry (Session Chair: Y. Grin)

16:50 **I-07** R. Telle (Aachen University) The quasi ternary system TiB₂-CrB₂-WB₂
17:20 **I-08** B. Albert (Technische Universitaet Darmstadt) Nanoscale Ferrous Metal Borides
17:50 **O-04** Y. Katsura (The University of Tokyo) Crystal structures and formation mechanisms of metal borides

Day 3 Tuesday, Sept. 24**Physics (Session Chair: P. Rogl)**

09:00	I-09	N. Sluchanko (Prokhorov General Physics Institute)	Maltese Cross Anisotropy in the Antiferromagnetic Metals $\text{Ho}_x\text{Lu}_{1-x}\text{B}_{12}$ with Dynamic Charge Stripes
09:30	I-10	T. Ogitsu (Lawrence Livermore National Laboratory)	Unique Quantum and Classical Properties of Elemental Boron
10:00	I-11	S. Suzuki (Tokyo University of Science)	The 7-fold Local Structure of Boron around Ytterbium and High Magnetic Transition Temperature in the Heavy Fermion Compound $\alpha\text{-YbAl}_{1-x}\text{Mn}_x\text{B}_4$

10:20 – 10:40 Coffee Break

Physics (Session Chair: K. Kimura)

10:40	I-12	H. Werheit (University Duisburg-Essen)	New insights in the impact of structural details on the electronic properties of boron carbide
11:10	I-13	M. H. Manghnani (University of Hawaii at Manoa)	Progress in Ultrahigh Pressure Studies of Elastic, Vibrational, Structural, and Electrical Properties of Boron Carbide up to 72 GPa
11:40	I-14	I. D. R. Mackinnon (Queensland University of Technology)	Boron and superconductivity
12:10	O-05	J. A. Alarco (Queensland University of Technology)	Insights on Superconductivity from DFT on Metal Borides

12:30 – 14:00 Lunch

Physics (Session Chair: H. Werheit)

14:00	I-15	M. Terauchi (Tohoku University)	Functional imaging of p/n-controlled CaB_6 and SrB_6 bulk specimens by soft X-ray emission spectroscopy microscope
14:30	I-16	V. V. Glushkov (The Russian Academy of Sciences)	Bulk and Surface Electrons in Topological Insulators SmB_6 and YbB_6
14:50	O-06	S. Gabani (Slovak Academy of Sciences)	Magnetic anisotropy of frustrated Shastry-Sutherland metallic systems ErB_4 and TmB_4

15:10 – 16:50 Coffee / Poster Session (P-17 ~ P-32)

Preparation & New Materials (Session Chair: B. Albert)

16:50	I-17	P. F. Rogl (University of Vienna)	Ternary Platinum Metal Borides
17:20	I-18	O. Yücel (Istanbul Technical University)	A Comparative Study on the Synthesis of (CoB, NiB) Metal-Boron Pre-alloys through Carbothermic and Metallothermic Processes
17:50	I-19	Y. Grin (Max-Planck-Institut für Chemische Physik fester Stoffe)	Heterophase reactions for preparation of borides

Day 4 Wednesday, Sept. 25**Application (Session Chair: O. Yücel)**

09:00	I-20	L. E. Pangilinan (University of California Los Angeles)	Extrinsic Hardening Effects in Superhard WB ₂ -SiC/B ₄ C Composites
09:20	O-07	A. Momozawa (Tokyo City University)	Applicability of an Empirical Equation for ZrB ₂ -SiC Oxidation Behavior
09:40	O-08	K. Jabri (SINTER LAND INC.)	Fabrication of Titanium Boride Molds using Spark Plasma Sintering Technique

10:00 – 10:20 Coffee Break

Application (Session Chair: T. Mori)

10:20	I-21	B. Fokwa (UC Riverside)	Designing Earth-Abundant Borides for Hydrogen Production
10:50	I-22	J. -F. Halet (Institut des Sciences Chimiques de Rennes)	Are Boride and Borocarbide Compounds Good Candidates for Thermoelectricity? Some Answers from a Theoretical Approach
11:20	O-10	G. Rogl (University Vienna)	Borides as important additives in thermoelectric materials

11:40 – 13:15 Lunch

13:15 – Excursion & Banquet

Day 5 Thursday, Sept. 26**Chemistry, Application (Session Chair: M. Takeda)**

09:00	I-23	H. Hillebrecht (University of Freiburg)	Electron Density in Boron-rich Borides in Experiment and Theory
09:30	O-11	J. M. Oliva-Enrich (Spanish National Research Council)	Weak and Strong Interactions in Boron Chemistry
09:50	O-12	H. Yanagie (The University of Tokyo)	Tumour Growth Suppression in Rabbit Hepatic Cancer Model by Boron Neutron Capture Therapy with Liposomal Boron Delivery Systems
10:10	O-13	M. Masutani (Nagasaki University)	Drug development in Boron Neutron Capture Therapy: An urgent need but a scientific and regulatory challenge

10:30 – 10:50 Coffee Break

Preparation & New Materials (Session Chair: J.-F. Halet)

10:50	I-24	V. L. Solozhenko (CNRS)	Chemical interaction and phase relations in the B-S and B-Se systems at high pressure and high temperature
11:20	I-25	N. VAST (Institut Polytechnique de Paris)	Theoretical phase diagram of boron carbide from ambient to high pressure and temperature
11:50	O-14	K. Shirai (Osaka University)	Order-Disorder Transition between δ -O and α -T boron
12:10	O-15	A. Chakraborti (Ecole Polytechnique)	Elemental synthesis of boron carbide at high pressures

Preparation & New Materials (Session Chair: B. Fokwa)

14:00	I-26	M. Somer (Koc University)	Processing and Applications of Amorphous Nano-sized Boron
14:30	O-16	Ö. Balci (Koc University)	Synthesis and magnetic properties of crystalline Co-Fe-B nanoparticles
14:50	O-17	D. Portehault (Sorbonne Universite)	Functional Nanoparticles of Metal borides and Boron Carbides from Molten salts: High Pressure Transformations and Properties

15:10 – 16:50 Coffee / Poster Session (P-33 ~ P-48)

Preparation & New Materials (Session Chair: J. Okada)

16:50	O-18	V. B. Filipov (National Academy of Sciences of Ukraine)	Growing High-Entropy Diborides from Hexaboride-containing Melt
17:10	O-19	B. Winkler (Goethe University)	New ternary transition metal borides: $W_{1.3}Re_{2.7}B_2$, $Mn_{3-x}Ir_5B_{2+x}$, Mn_2IrB_2
17:30	O-20	H-W. Son (University of Tsukuba)	Synthesis and characterization of p-n controllable $Y_xAl_yB_{14}$ prepared by reactive spark plasma sintering
17:50	O-21	T. Fujima (Tokyo City University)	Boron Content Dependence of a Hierarchical Nanoporous Layer Formation on a Silicate Glass Material

Day 6 Friday, Sept. 27**Structure (Session Chair: K. Shirai)**

09:20	I-27	F. R. Wagner (Max-Planck-Institut fuer Chemische Physik fester Stoffe)	Deciphering 3-Center Bonding Architectures in Boranes, Borophenes, Borides, and Borometallates
09:50	O-22	T. Hiroto (National Institute for Materials Science)	X-ray diffraction study on structural change around 550 K in β -rhombohedral boron

10:10 – 10:30 Coffee Break

Structure (Session Chair: K. Soga)

10:30	O-24	S. Kojima (University of Tsukuba)	Mixed Alkali Effect in Borate Glass
10:50	O-25	G. Roma (Universite Paris-Saclay)	Raman signature of point defects in boron carbide
11:10	O-26	U. Burkhardt (Max-Planck-Institut für Chemische Physik feste Stoffe)	EBSD based assignment of the absolute structure: case study $(Pt_{1-x}Cu_x)_3Cu_2B$ ($x=0.33$)
11:30 – 12:00		Closing Remarks	

Poster Presentations

Day 2 Monday, Sept. 23, 15:10 – 16:50

P-01	L. S. Chkhartishvili (Georgian Technical University)	Features of Boron Sheet Electron Energy Surfaces Topology
P-02	R. Ishibiki (University of Tsukuba)	Structure and Electronic States Variations of Hydrogen Boride Nanosheets with Heating
P-03	T. Goto (University of Tsukuba)	CO ₂ Adsorption on Hydrogen Boride Sheets with H-vacancy Defects
P-04	Y. Sato (The University of Tokyo)	Study of Electronic Structure of Silicene on Al(111) Substrate
P-05	M. Niibe (University of Hyogo)	Soft X-ray Absorption and Emission Spectra of Monolayer h-BN film
P-06	M. Niibe (University of Hyogo)	Soft X-ray Absorption and Emission Spectroscopy of Trace Boron doped in HOPG
P-07	H. Werheit (University Duisburg-Essen)	Systematic requirements for getting bulk or surface Raman spectra of solids through the examples boron carbide and some hexaborides
P-08	H. Werheit (University Duisburg-Essen)	Low-T specific heat anomalies associated with boson peak in isotope-enriched boron carbides B _{4,3} C - B ₁₀ C
P-09	Y. Sato (Tohoku University)	Electronic Structure of MgB ₄ studied by EELS and SXES
P-10	Y. Sato (Tohoku University)	Carrier plasmon of LaB ₆ studied by momentum transfer resolved EELS
P-11	N. E. Sluchanko (Russian Academy of Sciences)	On the origin of the record thermionic emission of LaB ₆
P-12	N. E. Sluchanko (Russian Academy of Sciences)	Infrared spectroscopy of rare-earth dodecaborides
P-13	N. E. Sluchanko (Russian Academy of Sciences)	Fine details of Structure and Lattice Dynamics in RB ₁₂ (R=Ho-Lu)
P-14	T. Aizawa (National Institute for Materials Science)	Phonon dispersion of CrB ₂ (0001) surface
P-15	A. Melentyev (Russian Academy of Sciences)	Infrared spectroscopy of Tm _{0.19} Yb _{0.81} B ₁₂
P-16	Z. Kelemen (Institut de Ciència de Materials de Barcelona)	Dense antipodal binding site polysubstitution of <i>o</i> -carborane - opening new possibilities for spherical close packing

Day 3 Tuesday, Sept. 24, 15:10 – 16:50

P-17	K. Gillet (Universite Paris- Saclay)	Charge state of intrinsic defects in carbon- rich boron carbide
P-18	K. Flachbart (Slovak Academy of Sciences)	Spin, charge and lattice dynamics of magnetization processes in frustrated Shastry-Sutherland system TmB ₄
P-19	V. Glushkov (Russian Academy of Sciences)	Depression of many-body states in narrow band semiconductor Sm _{1-x} Yb _x B ₆
P-20	V. Glushkov (Russian Academy of Sciences)	Transport properties of R _x La _{1-x} B ₆ solid solutions

P-21	H. Borrmann (Max-Planck Institute for Chemical Physics of Solids)	Peculiar Cleaving Behavior of SmB ₆ Single Crystals
P-22	J. Liu (Tokyo University of Science)	Photoexcitation Behavior of Micro-sized β -rhombohedral boron
P-23	P. Sauerschnig (National Institute for Materials Science)	Higher Boride REB ₆₆ thermoelectric materials
P-24	M. Takeda (Nagaoka University of Technology)	Synthesis and Thermoelectric Properties of Metal Tetraborides
P-25	S. Acar (Pavezyum Chemicals)	Industrial Scale Production of Elemental Boron and Metal Borides in Turkey: Pavezyum Chemicals
P-26	T. Chen (Gunma University)	Influence of Boriding Temperature on Microstructure and Tribological Properties of Titanium
P-27	K. Miyagawa (Nagaoka University of Technology)	Surface Modification of Metal Hexaboride Nano-Sized Particle Synthesized by Molten Salt Method
P-28	R. Koyama (Tokyo City University)	Effects of the metal additives on the microstructure and mechanical properties of Boron carbide based materials
P-29	Q. Guo (National Institute for Materials Science)	Thermoelectric and Mechanical Behavior of Boron-doped Higher Manganese Silicides
P-30	V. N. Gurin (Ioffe Institute)	Polyelemental solid solutions of rare-earth compounds
P-31	L. S. Chkhartishvili (Georgian Technical University)	Production of B ₄ C-MeB ₂ Composite Nanopowders from Liquid Charge
P-32	T. Ota (Tokyo City University)	Low-Temperature synthesis of Boron carbide by reaction boronizing sintering method
P-49	D. Abe (Japan Advanced Institute of Science and Technology)	Elastic and thermoelectric properties of transition metal boride cluster compounds Cr _x V _{1-x} B ₄ using first-principle calculations

Day 5 Tuesday, Sept. 26, 15:10 – 16:50

P-33	K. Igawa (Okayama University)	Effects of boron on cells and tissues
P-34	H. Yanagie (The University of Tokyo)	Surfactant Evaluation of ¹⁰ Boronododecaborate entrapped WOW emulsion as Intra-Arterial Boron Delivery Carrier for Neutron Capture Therapy to Hepatocellular Carcinoma
P-35	K. Kimura (The University of Tokyo)	Search for the boron-rich quasicrystals by First-principle-calculation and Electrostatic levitation supercooled-liquid quenching method
P-36	S. V. Devyatkin (Institute of General and Inorganic Chemistry)	Electrochemical Synthesis of TiB ₂ in (NH ₂) ₂ CO-(NH ₄) ₂ TiF ₆ -NH ₄ BF ₄ Melt at 135°C
P-37	M. Sakai (The University of Tokyo)	Li-doping to α -rhombohedral Boron using High-pressure Synthesis II

P-38	T. Shishido (Tohoku University)	Boron-nonstoichiometry, Solubility of Carbon, and Properties of Perovskite-Type RRh_3B ($R = \text{Rare Earth}$)
P-39	K. Kouzu (Kokushikan University)	Syntheses and some properties of $AlMgB_{14}$ and CaB_6 -type structure by metal fluoride and boron in Al flux method
P-40	K. Kouzu (Kokushikan University)	Syntheses and physical properties of $Tm(Al_{1-x}Mn_x)B_4$ crystals by Al-self flux
P-41	K. Shirai (Osaka University)	Li Doping to Boron at High Pressures
P-42	R. Hirai (Tokyo City University)	Synthesis and Mechanical Properties of AlN doped $AlMgB_{14}$
P-43	S. Okada (Kokushikan University)	Synthesis and some properties of $R(Al, Mo)B_4$ ($R = \text{rear earth}$) crystals
P-44	S. Okada (Kokushikan University)	Syntheses and physical properties of $YCrB_4$ and $R(Al, Fe, Cr)B_4$ ($R = Ho, Er$) compounds by arc melting method
P-45	J. Watanabe (Tokyo City University)	Synthesis and crystal structure of $Mo_2Ni_{1-x}Cr_xB_2$ hard materials
P-46	H. Morito (Tohoku University)	Electrical properties of Na-B binary compounds
P-47	K. Yubuta (Tohoku University)	Nanostructure with Diffuse Streaks in $ScRh_3B_{0.6}$ Compound Studied by Electron Microscopy
P-48	K. Shirai (Osaka University)	Theoretical Study on the Structure of $B_{13}N_2$