

**PAGE SPECIAL ISSUE: INTERNATIONAL CONFERENCE ON THERMOELECTRICS 2008**

- 915 Foreword  
*Jihui Yang, Heiner Linke, Harald Böttner, Mas Subramanian, George Nolas, and David C. Johnson*
- 916 Spatial Distribution of the Seebeck Coefficient in  $Zn_{13}Sb_{10}$  Determined by a Seebeck Microprobe Measurement System  
*Go Nakamoto and Makio Kurisu*
- 920 Fabrication of Bismuth Telluride-Based Alloy Thin Film Thermoelectric Devices Grown by Metal Organic Chemical Vapor Deposition  
*Sung-Do Kwon, Byeong-kwon Ju, Seok-Jin Yoon, and Jin-Sang Kim*
- 925 Synthesis of Thermoelectric Manganese Silicide by Mechanical Alloying and Pulse Discharge Sintering  
*Takashi Itoh and Masataka Yamada*
- 930 Thermoelectric Properties of *n*-Type Multiple-Filled Skutterudites  
*X. Shi, J.R. Salvador, J. Yang, and H. Wang*
- 934 Thermoelectric Properties of Directionally Solidified Half-Heusler  $(M_{0.5}^a M_{0.5}^b)NiSn$  ( $M^a, M^b = Hf, Zr, Ti$ ) Alloys  
*Yoshisato Kimura, Hazuki Ueno, and Yoshinao Mishima*
- 940 Seebeck Effect in IV–VI Semiconductor Films and Quantum Wells  
*Akihiro Ishida, Daoshe Cao, Sinsuke Morioka, Yoku Inoue, and Takuji Kita*
- 944 Thermoelectric Properties of Bismuth Micro/Nanowire Array Elements Pressured into a Quartz Template Mold  
*Yasuhiro Hasegawa, Masayuki Murata, Daiki Nakamura, Takashi Komine, Takashi Taguchi, and Shinichiro Nakamura*
- 950 Optimization of Microscale Thermoelectric Cooling (TEC) Element Dimensions for Hotspot Cooling Applications  
*P.Y. Hou, R. Baskaran, and K.F. Böhringer*
- 954 Effect of Nanoparticles on Electron and Thermoelectric Transport  
*Mona Zebarjadi, Keivan Esfarjani, Ali Shakouri, Zhixi Bian, Je-Hyeong Bahk, Gehong Zeng, John Bowers, Hong Lu, Joshua Zide, and Art Gossard*
- 960 Thermoelectric Transport in a ZrN/ScN Superlattice  
*Mona Zebarjadi, Zhixi Bian, Rajeev Singh, Ali Shakouri, Robert Wortman, Vijay Rawat, and Tim Sands*
- 964 Thermal Conductivity and Dimensionless Figure of Merit of Thermoelectric Rhodium Oxides Measured by a Modified Harman Method  
*W. Kobayashi, W. Tamura, and I. Terasaki*
- 968 Effect of Protective Layer and Etch Process on Silicon Molded Micro Peltier Arrays  
*M. Tonosaki, Y. Ishida, and H. Ryoson*
- 974 Thermoelectric Power Generation System Using Waste Heat from Biomass Drying  
*S. Maneewan and S. Chindaruksa*
- 981 Synthesis and Thermoelectric Properties of the Double-Filled Skutterudite  $Yb_{0.2}In_yCo_4Sb_{12}$   
*Jiangying Peng, Jian He, Paola N. Alboni, and Terry M. Tritt*
- 985 Low-Temperature Transport Properties of  $Sn_{24}P_{19.3}Br_8$  and  $Sn_{17}Zn_7P_{22}Br_8$   
*S. Stefanoski, L.N. Reshetova, A.V. Shevelkov, and G.S. Nolas*
- 990 Thermoelectric Properties of InSb Nanowires Over a Wide Temperature Range  
*O.N. Uryupin, M.V. Vedernikov, A.A. Shabal'din, Y.V. Ivanov, Y.A. Kumzerov, and A.V. Fokin*
- 994 Numerical Simulation of the Thermomechanical Behavior of Extruded Bismuth Telluride Alloy Module  
*Th. Clin, S. Turenne, D. Vasilevskiy, and R.A. Masut*
- 1002 Thermoelectric Properties of Heavily Doped *n*-Type  $SrTiO_3$  Bulk Materials  
*Yanjie Cui, James R. Salvador, Jihui Yang, Hsin Wang, Gisele Amow, and Holger Kleinke*

- 1008 Magnetron Deposition of *In Situ* Thermoelectric Mg<sub>2</sub>Ge Thin Films  
*L. Chuang, N. Savvides, and S. Li*
- 1013 Thermoelectric Properties of B-Site Substituted LaRhO<sub>3</sub>  
*S. Shibasaki, Y. Takahashi, and I. Terasaki*
- 1017 Synthesis of Nanocomposites with Improved Thermoelectric Properties  
*X.B. Zhao, S.H. Yang, Y.Q. Cao, J.L. Mi, Q. Zhang, and T.J. Zhu*
- 1025 Preliminary Study of Single Phase Preparation and Doping Effect of  $\beta$ -Zn<sub>4</sub>Sb<sub>3</sub>  
*Takashi Ueda and Kazuhiro Hasezaki*
- 1030 New Ternary Arsenides for High-Temperature Thermoelectric Applications  
*Hong Xu, Tim Holgate, Jian He, Zhe Su, Terry M. Tritt, and Holger Kleinke*
- 1037 Measurement of Local Peltier Constant at a Microcontact  
*Mikio Koyano and Naoya Akashi*
- 1041 Thermoelectric Characteristics of *p*-Type (Bi,Sb)<sub>2</sub>Te<sub>3</sub>/(Pb,Sn/Te) Functional Gradient Materials with Variation of the Segment Ratio  
*Tae-Sung Oh*
- 1048 Thermal Conductivity of Bi<sub>0.5</sub>Sb<sub>1.5</sub>Te<sub>3</sub> Affected by Grain Size and Pores  
*Takashi Hamachiyo, Maki Ashida, and Kazuhiro Hasezaki*
- 1052 Open-Structured Materials: Skutterudites and Clathrates  
*G.S. Nolas, X. Lin, J. Martin, M. Beekman, and H. Wang*
- 1056 Microstructure and Thermoelectric Properties of *n*- and *p*-Type Doped Mg<sub>2</sub>Sn Compounds Prepared by the Modified Bridgman Method  
*H.Y. Chen and N. Savvides*
- 1061 Extruded Bismuth-Telluride-Based *n*-Type Alloys for Waste Heat Thermoelectric Recovery Applications  
*C. André, D. Vasilevskiy, S. Turenne, and R.A. Masut*
- 1068 Thermoelectric Properties of Zintl Compound YbZn<sub>2</sub>Sb<sub>2</sub> with Mn Substitution in Anionic Framework  
*T.J. Zhu, C. Yu, J. He, S.N. Zhang, X.B. Zhao, and Terry M. Tritt*
- 1072 Composites of Higher Manganese Silicides and Nanostructured Secondary Phases and Their Thermoelectric Properties  
*A.J. Zhou, X.B. Zhao, T.J. Zhu, Y.Q. Cao, C. Stiewe, R. Hassdorf, and E. Mueller*
- 1078 Transition-Metal Oxides for Thermoelectric Generation  
*J.P. Doumerc, M. Blangero, M. Pollet, D. Carlier, J. Darriet, R. Berthelot, C. Delmas, and R. Decourt*
- 1083 Approach to the Practical Use of Thermoelectric Power Generation  
*Takenobu Kajikawa*
- 1089 Deposition of Bismuth Telluride Thick Film by Solidification under Centrifugal Pressure  
*Yoshiaki Kinemuchi, Tomohiro Aoki, Hisashi Kaga, Kumi Okanou, Hirohide Ishiguro, and Koji Watari*
- 1093 Modeling a Thermoelectric HVAC System for Automobiles  
*C.S. Junior, N.C. Strupp, N.C. Lemke, and J. Koehler*
- 1098 Doping Effects in Rare-Earth Borides  
*T. Mori, T. Shishido, and K. Nakajima*
- 1104 Thermoelectric Oxides: Effect of Doping in Delafossites and Zinc Oxide  
*E. Guilmeau, A. Maignan, and C. Martin*
- 1109 Microchip for the Measurement of Seebeck Coefficients of Single Nanowires  
*F. Völklein, M. Schmitt, T.W. Cornelius, O. Picht, S. Müller, and R. Neumann*
- 1116 On the Excess Oxygen in Four-Layered Rock-Salt-Type Units of Modulated Thermoelectric Bi-Sr-(Co,Rh)-O Compounds  
*Kunio Yubuta, Yuzuru Miyazaki, Ichiro Terasaki, and Tsuyoshi Kajitani*
- 1121 Development of a Thermoelectric Module Using the Heusler Alloy Fe<sub>2</sub>VAI  
*M. Mikami, K. Kobayashi, T. Kawada, K. Kubo, and N. Uchiyama*
- 1127 Soft X-ray Absorption and Photoemission Spectroscopy Study of Cobalt-Based Thermoelectric Oxides: Ca<sub>3</sub>Co<sub>4</sub>O<sub>9</sub>, Ca<sub>3</sub>Co<sub>2</sub>O<sub>6</sub>, and Bi<sub>2</sub>Sr<sub>2</sub>Co<sub>2</sub>O<sub>7</sub>  
*J.-S. Kang, H.J. Lee, D.H. Kim, T. Fujii, I. Terasaki, H.L. Park, Y.H. Jeong, and B.I. Min*

- 1132 Thermoelectric Properties of  $\text{In}_{0.3}\text{Ga}_{0.7}\text{N}$  Alloys  
*B.N. Pantha, R. Dahal, J. Li, J.Y. Lin, H.X. Jiang, and G. Pomrenke*
- 1136 Synthesis, Crystal Structure, and Transport Properties of  $\text{Na}_{22}\text{Si}_{136}$   
*M. Beekman, C.P. Sebastian, Yu. Grin, and G.S. Nolas*
- 1142 Effects of Ball-Milling Atmosphere on the Thermoelectric Properties of TAGS-85 Compounds  
*S.N. Zhang, J. He, X.H. Ji, Z. Su, S.H. Yang, T.J. Zhu, X.B. Zhao, and Terry M. Tritt*
- 1148 Efficient Switched Thermoelectric Refrigerators for Cold Storage Applications  
*U. Ghoshal and A. Guha*
- 1154 Microstructures and Thermoelectric Properties of an Annealed  $\text{Ti}_{0.5}(\text{Hf}_{0.5}\text{Zr}_{0.5})_{0.5}\text{NiSn}_{0.998}\text{Sb}_{0.002}$  Ribbon  
*Takao Morimura, Masayuki Hasaka, Syotaro Yoshida, and Hiromichi Nakashima*
- 1159 Structure and High-Temperature Thermoelectric Properties of the *n*-Type Layered Oxide  $\text{Ca}_{2-x}\text{Bi}_{x-6}\text{MnO}_{4-7}$   
*F. Kawashima, X.Y. Huang, K. Hayashi, Y. Miyazaki, and T. Kajitani*
- 1163 Intrinsic Seebeck Coefficient of Quantum Dots  
*Preeti Mani, Natthapon Nakpathomkun, and Heiner Linke*
- 1166 Thermoelectric Properties of the One-Dimensional Cobalt Oxide  $\text{CaCo}_2\text{O}_4$   
*Masaaki Isobe, Masao Arai, and Eiji Takayama-Muromachi*
- 1171 Thermoelectric Properties of Organic Charge-Transfer Compounds  
*H. Itahara, M. Maesato, R. Asahi, H. Yamochi, and G. Saito*
- 1176 Electrodeposition and Thermoelectric Characteristics of  $\text{Bi}_2\text{Te}_3$  and  $\text{Sb}_2\text{Te}_3$  Films for Thermopile Sensor Applications  
*Min-Young Kim and Tae-Sung Oh*
- 1182 The Thermoelectric Performance of Poly(3,4-ethylenedioxythiophene)/Poly(4-styrenesulfonate) Thin Films  
*Kuei-Chien Chang, Ming-Shan Jeng, Chang-Chung Yang, Ya-Wen Chou, Shih-Kuo Wu, Marin Andrew Thomas, and Yen-Chun Peng*
- 1189 Molecular Dynamics Simulation on Mechanics of Skutterudite  $\text{CoSb}_3$  Nanowire  
*Xuqiu Yang, Pengcheng Zhai, An Zhou, Lisheng Liu, and Qingjie Zhang*
- 1194 The Effect of High-Pressure Sintering Process on the Microstructure and Thermoelectric Properties of  $\text{CoSb}_3$   
*Chao Mei, Yao Li, Guodong Li, Mingfa Li, and Pengcheng Zhai*
- 1200 Effect of Cyclic Thermal Loading on the Microstructure and Thermoelectric Properties of  $\text{CoSb}_3$   
*Pengfei Wen, Peng Li, Qingjie Zhang, Fajun Yi, Lisheng Liu, and Pengcheng Zhai*
- 1206 Modeling Energy Recovery Using Thermoelectric Conversion Integrated with an Organic Rankine Bottoming Cycle  
*Erik W. Miller, Terry J. Hendricks, and Richard B. Peterson*
- 1214 New Physical Model for Thermoelectric Generators  
*Michael Freunek, Monika Müller, Tolgay Ungan, William Walker, and Leonhard M. Reindl*
- 1221 High Thermoelectric Power Factor Near Room Temperature in Full-Heusler Alloys  
*Eric J. Shouq, Chen Zhou, Yanzhong Pei, and Donald T. Morelli*
- 1224 Microstructure and Thermoelectric Properties of Yb-Filled Skutterudites Prepared by Rapid Solidification  
*H. Li, X. Tang, and Q. Zhang*
- 1229 Preparation of Well-Tiled  $\gamma\text{-Na}_2\text{Co}_2\text{O}_4$  by a Novel and Simple Sodium Alginate Gel Method and Its Electrical Properties  
*Li Zhang, Xinfeng Tang, and Wenbin Gao*
- 1234 High Thermoelectric Performance of Dually Doped  $\text{ZnO}$  Ceramics  
*Michitaka Ohtaki, Kazuhiko Araki, and Kiyoshi Yamamoto*
- 1239 Experimental Characterization of Thermoelectric Modules and Comparison with Theoretical Models for Power Generation  
*Emil Sandoz-Rosado and Robert J. Stevens*
- 1245 Automotive Applications of Thermoelectric Materials  
*Jihui Yang and Francis R. Stabler*
- 1252 Self-Assembly for Integration of Microscale Thermoelectric Coolers  
*Nathan B. Crane, Pradeep Mishra, Jeffrey L. Murray Jr., and G.S. Nolas*

- 1257 Micro- and Nano-Technology: A Critical Design Key in Advanced Thermoelectric Cooling Systems  
*Terry J. Hendricks and Naveen K. Karri*
- 1268 Thermoelectric Materials with Potential High Power Factors for Electricity Generation  
*Qiang Li, Zhiwei Lin, and Juan Zhou*
- 1273 Preparation and Thermoelectric Properties of  $\text{Ag}_{0.5}\text{In}_{0.5-x}\text{Pb}_5\text{Sn}_4\text{Te}_{10}$   
*Y. Yan, X. Tang, H. Liu, and Q. Zhang*
- 1278 Microstructure and Thermoelectric Transport Properties of Type I Clathrates  $\text{Ba}_8\text{Sb}_2\text{Ga}_{14}\text{Ge}_{30}$  Prepared by Ultrarapid Solidification Process  
*Y. Yan, X. Tang, P. Li, and Q. Zhang*
- 1282 Electronic Structure and Thermoelectric Properties of the Delafossite-Type Oxides  $\text{CuFe}_{1-x}\text{Ni}_x\text{O}_2$   
*T. Nozaki, K. Hayashi, and T. Kajitani*
- 1287 Thermoelectric Properties of  $\text{NdGd}_{1+x}\text{S}_3$  Prepared by  $\text{CS}_2$  Sulfurization  
*Michihiro Ohta and Shinji Hirai*
- 1293 Design of a Miniaturized Thermoelectric Generator Using Micromachined Silicon Substrates  
*Israel Boniche, Sivaraman Masilamani, Ryan J. Durscher, Brian C. Morgan, and David P. Arnold*
- 1303 Solid-State Self-Assembly of Nanostructured Oxide as a Candidate High-Performance Thermoelectric Material  
*Atsuko Kosuga, Ken Kurosaki, Kunio Yubuta, Anek Charoenphakdee, Shinsuke Yamanaka, and Ryoji Funahashi*
- 1309 Characterization of Single Barrier Microrefrigerators at Cryogenic Temperatures  
*X. Wang, Y. Ezzahri, Z. Bian, M. Zebarjadi, A. Shakouri, J. Klem, G. Patrizi, E.W. Young, and S.D. Mukherjee*
- 1315 A Natural-Gas-Fired Thermoelectric Power Generation System  
*K. Qiu and A.C.S. Hayden*
- 1320 Thermoelectric Properties of  $\text{Ti}_x(\text{Hf}_y\text{Zr}_{1-y})_{1-x}\text{NiSn}_{0.998}\text{Sb}_{0.002}$  Half-Heusler Ribbons  
*Masayuki Hasaka, Takao Morimura, Hanae Sato, and Hiromichi Nakashima*
- 1326 Fabrication and Evaluation of a Thermoelectric Microdevice on a Free-Standing Substrate  
*J. Kurosaki, A. Yamamoto, S. Tanaka, J. Cannon, K. Miyazaki, and H. Tsukamoto*
- 1331 Transport Properties and Cationic Substitutions in  $\text{Sr}_2\text{IrO}_4$   
*Y. Klein and I. Terasaki*
- 1337 Thermoelectric Properties of  $\text{Co}_4\text{Sb}_{12}$  Skutterudite Materials with Partial In Filling and Excess In Additions  
*Ramesh Chandra Mallik, Christian Stiewe, Gabriele Karpinski, Ralf Hassdorf, and Eckhard Müller*
- 1344 Addressing the Challenges of Commercializing New Thermoelectric Materials  
*Lon E. Bell*
- 1350 Thermoelectric Properties of  $\text{TlCu}_3\text{Te}_2$  and  $\text{TlCu}_2\text{Te}_2$   
*H. Matsumoto, K. Kurosaki, H. Muta, and S. Yamanaka*
- 1354 Unusual Increase of Electron Thermal Conductivity Caused by a Pseudogap at the Fermi Level  
*Tsunehiro Takeuchi*
- 1360 Thermoelectric Properties and Electronic Structure of Bi- and Ag-Doped  $\text{Mg}_2\text{Si}_{1-x}\text{Ge}_x$  Compounds  
*K. Mars, H. Ihou-Mouko, G. Pont, J. Tobola, and H. Scherrer*
- 1365 Large Thermoelectric Power of  $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$  Possessing Two-Dimensional Electronic Structure  
*Haduki Komoto and Tsunehiro Takeuchi*
- 1371 Performance Improvement of Flexible Thermoelectric Device: FEM-Based Simulation  
*K. Shimizu, Y. Takase, and M. Takeda*
- 1375 Performance Results of a High-Power-Density Thermoelectric Generator: Beyond the Couple  
*D.T. Crane, J.W. LaGrandeur, F. Harris, and L.E. Bell*
- 1382 Modeling the Building Blocks of a 10% Efficient Segmented Thermoelectric Power Generator  
*D.T. Crane, D. Kossakovski, and L.E. Bell*
- 1387 The Effects of Polysilastyrene and Au Additions on the Thermoelectric Properties of  $\beta\text{-SiC/Si}$  Composites  
*H. Nakatsugawa, K. Nagasawa, Y. Okamoto, S. Yamaguchi, S. Fukuda, and H. Kitagawa*

- 1392 Thermoelectric Characterization of  $(\text{Ga,In})_2\text{Te}_3$  with Self-Assembled Two-Dimensional Vacancy Planes  
S. Yamanaka, M. Ishimaru, A. Charoenphakdee, H. Matsumoto, and K. Kurosaki
- 1397 Electrical Transport Properties of Filled  $\text{CoSb}_3$  Skutterudites: A Theoretical Study  
Jiong Yang, L. Xi, W. Zhang, L.D. Chen, and Jihui Yang
- 1402 X-Ray Characterization of Low-Thermal-Conductivity Thin-Film Materials  
Paul Zschack, Colby Heideman, Clay Mortensen, Ngoc Nguyen, Mary Smeller, Qiyin Lin, and David C. Johnson
- 1407 Microstructure and Crystal Structure in TAGS Compositions  
A.J. Thompson, J.W. Sharp, and C.J. Rawn
- 1412 First-Principles Study of Semiconducting Clathrate  $\text{Ba}_8\text{Al}_{16}\text{Ge}_{30}$   
K. Akai, T. Uemura, K. Kishimoto, T. Tanaka, H. Kurisu, S. Yamamoto, T. Koyanagi, K. Koga, H. Anno, and M. Matsuura
- 1418 Transport Properties of Doped, Nanostructured IV–VI Epitaxial Films Grown by MBE  
J.D. Koenig, M. Winkler, and H. Boettner
- 1423 Thermal Stability and Phase Purity in Polycrystalline  $\text{Ba}_8\text{Ga}_x\text{Ge}_{46-x}$   
Ali Saramat, Eric S. Toberec, Andrew F. May, and G. Jeffery Snyder
- 1427 Electronic Structure and Thermoelectric Properties of Si-Based Clathrate Compounds  
K. Koga, K. Suzuki, M. Fukamoto, H. Anno, T. Tanaka, and S. Yamamoto
- 1433 Thermal Expansion Studies of Selected High-Temperature Thermoelectric Materials  
Vilapanur Ravi, Samad Firdosy, Thierry Caillat, Erik Brandon, Keith Van Der Walde, Lina Maricic, and Ali Sayir
- 1443 Preparation of Conducting Polyaniline–Bismuth Nanoparticle Composites by Planetary Ball Milling  
H. Anno, M. Fukamoto, Y. Heta, K. Koga, H. Itahara, R. Asahi, R. Satomura, M. Sannomiya, and N. Toshima
- 1450 Influence of Group IV–Te Alloying on Nanocomposite Structure and Thermoelectric Properties of  $\text{Bi}_2\text{Te}_3$  Compounds  
D.G. Ebling, A. Jacquot, H. Böttner, L. Kirste, J. Schmidt, and M. Aguirre
- 1456 Multiphysics Simulation of Thermoelectric Systems for Comparison with Experimental Device Performance  
Dirk Ebling, Martin Jaegle, Markus Bartel, Alexandre Jacquot, and Harald Böttner
- 1462 Discommensuration of Doped  $[\text{Ca}_x\text{CoO}_3]_p\text{CoO}_2$   
Tsuyoshi Kajitani, Kunio Yubuta, Xiangyang Huang, and Yuzuru Miyazaki
- 1468 Thermoelectric Properties of Zn-Substituted Magnetite  
A. Hirahara, T. Tamura, Y. Oikawa, Y. Kawamura, and H. Ozaki
- 1472 Evaluation of the Thermal Comfort of a Thermoelectric Ceiling Cooling Panel (TE-CCP) System  
Charoenporn Lertsatitthanakorn, Lamal Wiset, and Surat Attahajariyakul
- 1478 Thermoelectric Properties of  $(\text{Pb,Sn,Ge})\text{Te}$ -Based Alloys  
Y. Gelbstein, O. Ben-Yehuda, E. Pinkas, T. Edrei, Y. Sadia, Z. Dashevsky, and M.P. Dariel
- 1483 Thermal Shunts in Thermoelectric Energy Scavengers  
V. Leonov
- 1491 Wearable Thermoelectric Generators for Body-Powered Devices  
V. Leonov and R.J.M. Vullers
- 1499 Improvement of Thermoelectric Power Factor of Hydrothermally Prepared  $\text{Bi}_{0.5}\text{Sb}_{1.5}\text{Te}_3$  Compared with its Solvothermally Prepared Counterpart  
Chia-Jyi Liu, Gao-Jhith Liu, Chun-Wei Tsao, and Yo-Jhith Huang
- 1504 Doping Effects on the Thermoelectric Properties of  $\text{AgSbTe}_3$   
V. Jovovic and J.P. Heremans
- 1510 Three-Stage Thin-Film Superlattice Thermoelectric Multistage Microcoolers with a  $\Delta T_{\text{max}}$  of 102 K  
Gary E. Bulman, Ed Sivola, Ryan Witala, Rama Venkatasubramanian, Michael Acree, and Nathan Ritz
- 1516 Off-Center Guest Vibrations and Their Effect on Lattice Thermal Conductivity in *n*- and *p*-Type  $\beta\text{-Ba}_8\text{Ga}_{16}\text{Sn}_{30}$   
Koichiro Suekuni, Tomoo Tanaka, Shuhei Yamamoto, Marcos A. Avila, Kazunori Umeo, Yuichi Takasu, Takumi Hasegawa, Norio Ogita, Masayuki Udagawa, and Toshiro Takabatake