23rd International Workshop on Rare Earth and Future Permanent Magnets and Their Applications (REPM2014)

Annapolis, Maryland, USA
17 - 21 August 2014

ISBN: 978-1-5108-4338-7
8:00 – 8:15 AM – Opening Remarks
8:15 – 9:00 AM – Keynote Address – Dr. Oliver Gutfleisch
“Re-thinking Rare Earths: Demand, Sustainability and the Reality of Alternatives”

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Chinese Society of Rare Earth, Beijing, China

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CSIRO Materials Science and Engineering, Lindfield NSW, Australia 2070

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Colorado School of Mines, Golden, CO USA

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2EEIMVR – Federal Fluminense University, Volta Redonda, Rio de Janeiro, Brazil

10:18 – 10:30 AM - R Gopalan
“The Indian Rare Earth Scenario – Present and Future”
Centre for Automotive Energy Materials, ARCI, IIT-M Research Park, India

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10:45 – 11:07 AM – Alexander H. King
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Critical Materials Institute, The Ames Laboratory, Ames, IA USA

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1Technology Metals Research, LLC, Carpentersville, IL USA
2Innovation Metals Corp, Toronto, Ontario, Canada
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President, USMMA
Vice President, Thomas & Skinner, Inc.

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I.R. Harris, B. Guerrero *, C. Bagan *, A. Conesa * V. Schaller ^
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Magnetic Materials Group, University of Birmingham, Edgbaston, Birmingham, UK
* Leitat Technology Centre - C/ de la Innovació, 2 - 08225 Terrassa, Barcelona, Spain.

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Electron Energy Corporation Technology Center, Landisville, PA USA

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M. Sagawa³
“Recent Progress in High-Performance Magnets” ................................................................ 34
¹Department of Materials Science, Graduate School of Engineering, Tohoku University;
²Intermetallics CO., LTD., JAPAN

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Electron Energy Corporation Technology Center, Landisville, PA USA

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Magnequench Technology Centre, 01-19 The Galen, 61 Science Park Road, Singapore 117525

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Division of Functional Materials, Central Iron and Steel Research Institute, Beijing, China

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“Microstructure and Coercivity of Tb₄O₇ Grain Boundary Diffusion Processed
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¹Elements Strategy Initiative Center for Magnetic Materials (ESICMMM)
National Institute for Materials Science, Tsukuba
²Graduate School of Pure and Applied Sciences, University of Tsukuba
³Magnetic Materials Research Center, Shin-Etsu Chemical Co. Ltd., Japan

3:38 – 3:50 PM - Michihide Nakamura¹, Masashi Matsuura¹, Nobuki Tezuka¹,
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¹Department of Materials Science, Graduate School of Engineering, Tohoku University;
²Intermetallics Co., Ltd, Nagoya 463-0003
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Upgrade in China”
Yantai Shougang Magnetic Materials Inc. (YSM), Shandong Province, China

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President – ACM Magnetics, Inc.

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1University of Dayton Magnetics Lab., Dayton, OH USA; 2 Air Force Research Laboratory, Propulsion Directorate, Wright-Patterson Air Force Base, OH USA
3 Air Force Research Laboratory, Directed Energy Directorate, Kirtland Air Force Base, NM USA
4 Magnet Energy Corp., San Jose, CA USA

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1Nebraska Center for Materials and Nanoscience and Department of
Physics and Astronomy, University of Nebraska, Lincoln, NE USA
2Department of Physics, South Dakota State University, Brookings, SD USA

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O. Akdogan1,2, S. Ponomareva1,2, G. Shaw1,2, J.F. Motte1,2, F. Marchi1,2, R. Kramer1,2,
K. Hasselbach1,2, O. Cugat3, F. Dumas-Bouchiat4 and D. Givord1,2,5
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1Univ. Grenoble Alpes, Inst. NEEL, France; 2CNRS, Inst. NEEL, Grenoble, France; 3Univ. Grenoble Alpes, G2Elab, Grenoble,
France; 4Univ Limoges, CNRS, SPCTS, France; 5Instituto de Fisica, Universidade Federal do Rio de Janeiro, Brasil

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Coercivity Enhancement”
1Univ. Grenoble Alpes, Institut NEEL, F-38042 Grenoble, France
2CNRS, Institut NEEL, F-38042 Grenoble, France
3Instituto de Fisica, Universidade Federal do Rio de Janeiro, Rio de Janeiro RJ, Brasil
7:00 – 9:00 PM – POSTER SESSION

Posters A – Non-Rare Earth

AP1 - Konrad Löwe1, Farzin Tabary1, Bianca Frincu1, Xiacao Hu3, Oliver Gutfeisch1, 2 and George C. Hadjipanayis3
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1TU Darmstadt, Petersenstr. 23, 64287 Darmstadt, Germany
2Fraunhofer ISC, IWKS Group Materials Recycling and Resource Strategy, Hanau, Germany
3Department of Physics and Astronomy, University of Delaware, Newark, DE, USA

AP2 - P. Hernández-Gómez1, Xiansong Liu2, J. M. Muñoz1, C. Torres1 and O. Alejos1
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1Univ. Valladolid, Dpto. Electricidad y Electrónica, 47071 Valladolid, Spain
2Univ. Anhui, School of Physics and Materials Science, Hefei 230039, PR China

AP3 - V.P. Menushenkov, M.V. Gorshenkov, E.S. Savchenko, G.G. Zhukov, A.G. Savchenko, I.V. Shetinin
“Evolution of the Microstructure and Magnetic Properties of Rapidly Solidified Fe2NiAl Alloy during Annealing at 500-780°C”
National Research Technological University “NITU MISiS”, Moscow, Russia

AP4 - Yunglong Geng, Timothy Prost, Michael Lucis and Jeffrey E. Shield
“Microstructural Evolution in Mn-Al-based Permanent Magnet Alloys”
Department of Mechanical & Materials Engineering, Nebraska Center for Materials and Nanoscience, University of Nebraska-Lincoln

“High Coercive Isotropic CoFe2O4 Powders Obtained by Ultrafast Milling”
1 IMDEA Nanoscience, Madrid, Spain
2 Electroceramic Department, Instituto de Cerámica y Vidrio, CSIC, Madrid, Spain
3 Institute for Energy Technology, 2027 Kjeller, Norway

AP6 - Siqian Zhao1, Toshiya Hozumi1, 2, Patrick LeClair1 Gary Mankey1 and Takao Suzuki1
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1Center for Materials for Information Technology (MINT), The University of Alabama, Tuscaloosa, AL USA
2Advanced Technology Development Center, TDK Corporation, Narita, Japan

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Department of Chemical Engineering, Northeastern University, Boston, MA, USA

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1Department of Physics and Astronomy, University of Delaware, Newark, DE USA
2Nanotechnology and Nanometrology Lab., National Institute for Standards, Giza 12211, Egypt
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“Combinatorial Search for Rare-Earth-Free Permanent Magnets: Comparison of Thin Film to Bulk Fe-Co-V Vicalloys”
1Department of Materials Science and Engineering, University of Maryland, College Park, MD USA
2National Institute of Standards and Technology (NIST), Gaithersburg, MD USA
3Institute for Materials Ruhr-University, Bochum, Germany

AP10 – Y.L. Sun1, J.T. Zhao1, Z. Liu1, W.X. Xia1, D. Lee1, and A.R. Yan1, 2

“The Phase and Microstructure Analysis of AlNiCo Magnets with High Coercivity”
1Zhejiang Province Key Laboratory of Magnetic Materials and Application
Technology, Ningbo Institute of Material Technology and Engineering, Chinese Academy of Sciences, Ningbo, China
2Key Laboratory of Magnetic Materials and Devices, Ningbo Institute of Material Technology and Engineering, Chinese Academy of Sciences, Ningbo, China

Posters A – Applications

AP11 – Ryogen Fujiwara1, Tadahiko Shinshi2*, Elito Kazawa3, Minoru Uehara4

“Micro Magnetization Assisted by Laser Heating for Sputtered NdFeB/Ta Multilayered Film”
1Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, Yokohama, Japan
2Precision and Intelligence Laboratory, Tokyo Institute of Technology, Yokohama, Japan
3Research and Development Department, Tokyo Metropolitan Industrial Technology Research Institute, Tokyo, Japan
4Magnetic Materials Research Laboratory, Hitachi Metals, Ltd., Osaka, Japan

AP12 - H. Allag1, 3, J-P. Yonnet1, 2

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1Université Grenoble Alpes, G2E Lab, St Martin d’Hères, France
2Centre National de la Recherche Scientifique, G2E Lab, Grenoble, France
3Jijel University, Jijel, Algeria

AP13 – James Murphy

“Magnetization and Measurement of PM Motors”
MAGSYS Magnet Systeme, St. Louis, MO USA

AP14 - S. Prakash Narayan

“Magnetic Measurements of High Energy Rare Earth Magnets Using HELMHOLTZ Coils”
Mansarovar Institute of Science & Technology (MIST), Bhopal-India

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“Grain Boundaries and Particle Size as a Source of Coercivity Enhancement”

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Magnetic Materials Research Laboratory, Magnetic Materials Company, Hitachi Metals, Ltd. Egawa, Shimamoto, Osaka Japan

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AP18 - Y. Shen$^{1,2}$, S. Leontsev$^{1,2}$, Z. Turgut$^{2,3}$, A. O. Sheets$^{2,3}$, N. Bryant$^{2,4}$, J. C. Horwath$^2$

“Anisotropic Sm-Co/Fe Composite Particles by Surfactant-Assisted High Energy Ball Milling”

$^1$University of Dayton, Dayton, OH, USA
$^2$Air Force Research Laboratory, Wright-Patterson Air Force Base, OH, USA
$^3$UES Inc., Dayton, OH, USA
$^4$Wright State University, Dayton, OH, USA

AP19 - X.C. HU$^{1,2}$, G.C. HADJIPANAYIS$^2$, D.J. SELLMYER$^3$

“Annealing Effect on L1$_0$ FePt Nanoparticles Prepared by Ball Milling of Layered Crystal Fe(H$_2$O)$_6$PtCl$_6$”

$^1$Department of Materials Science and Engineering, University of Delaware, DE 19716, USA
$^2$Department of Physics and Astronomy, University of Delaware, DE 19716, USA
$^3$Department of Physics and Astronomy, University of Nebraska, Lincoln, NE 68588, USA

Posters A – Thin Films

AP20 - I.Luciu$^1$, D. Duday$^1$, T. Wirtz$^1$, P. Choquet$^1$, P. Szary$^2$, A. Michels$^2$

“Studies on NdFeB Thin Films Deposited on Microwires”

$^1$Science and Analysis of Materials (SAM), Centre de Recherche Public, Gabriel Lippmann, Luxembourg
$^2$Physics and Materials Research Unit, University of Luxembourg, Luxembourg

AP21 - T. Furuuchi, H. Iwama, M. Doi and T. Shima

“Effect of Non-Magnetic Layer Diffusion for Nd-Fe-B Thin Films with Particulate Structure”

Tohoku Gakuin University, Tagajo, Japan

AP22 - W.Y. Zhang$^{1,2}$, P. Kharel$^3$, and David J Sellmyer$^{1,2}$

“Development of High-Anisotropy MnBi Thick Films”

$^1$Nebraska Center for Materials and Nanoscience, University of Nebraska, Lincoln, NE USA
$^2$Department of Physics and Astronomy, University of Nebraska, Lincoln, NE USA
$^3$Department of Physics, South Dakota State University, Brookings, SD USA


“Magnetization Reversal Behavior of FePt/ MgO/ FePt Circular Dot Arrays”

Tohoku Gakuin University, Tagajo 985-8537, Japan

AP24 - Mitsuru Ohtake and Masaaki Futamoto

“Structural Characterization of Rare Earth-Transition Metal Alloy Thin Film with Ordered Structure by Diffraction”

Faculty of Science and Engineering, Chuo University, Tokyo 112-8551, Japan

AP25 - O. Akdogan$^{1,2}$, N. M. Dempsey$^{1,2}$ and D. Givord$^{1,2,3}$

“Rapid Production of Highly Coercive Sm-Co Thin Films by Triode Sputtering”

$^1$Univ. Grenoble Alpes, Institut NEEL, F-38042 Grenoble, France
$^2$CNRS, Institut NEEL, F-38042 Grenoble, France
$^3$Instituto de Fisica, Universidade Federal do Rio de Janeiro, Rio de Janeiro RJ, Brasil
AP26 - Ataru Suzuki¹, Takato Yanagawa¹, Yusuke Hotta¹, Makoto Yamada¹, Mitsuru Ohtake¹, Fumiyoshi Kirino², and Masaaki Futamoto¹
“Preparation of SmCo5 Alloy Single-Crystal Thin Films on bcc(211) and hcp(1100) Underlayers”
¹Faculty of Science and Engineering, Chuo University, Tokyo 112-8551, Japan
²Graduate School of Fine Arts, Tokyo National University of Fine Arts and Music, Tokyo, Japan

AP27 - N. Gunduz Akdogan¹,², N. M. Dempsey¹,², D. Givord¹,²,³, A. Manabe⁴, T. Shoji⁴, M. Yano⁴ and A. Kato⁴
“Effect of Rapid Thermal Annealing on Thick and Thin Nd-Fe-B films Prepared by Sputtering”
¹Univ. Grenoble Alpes, Inst NEEL, Grenoble, France. ²CNRS, Inst NEEL, Grenoble, France. ³Instituto de Fisica, Universidade Federal do Rio de Janeiro, Rio de Janeiro RJ, Brasil. ⁴Toyota Motor Company, Shizuoka, Japan

AP28 - Marcos Flavio de Campos¹, Fernanda A. Sampaio da Silva¹, Daniel Rodrigues¹, Jose Adilson de Castro¹
“Crystallographical Texture and Coercivity in Nanosize Thin Films for Magnetic Recording”
¹UFF – Universidade Federal Fluminense – Volta Redonda RJ BRAZIL

AP29 - V. Madurga, C. Favieres, J. Vergara
“Exploring on the Ability of the Glacing Angle Deposition to Produce High Anisotropic Magnetic Films with High Coercivity”
Laboratory of Magnetism. Department of Physics. Public University of Navarre. Campus de Arrosadia s/n. E-31006, Pamplona, Spain

Posters A – Nd-Fe-B Sintered Magnets/Recycling

AP30 - W. Q. Liu¹ *, C. Li¹, M. Zakotnik¹ *, M. Yue¹, D. T. Zhang², T. Y. Zuo²
“Waste Nd-Fe-B Sintered Magnets Recycling by Doping with DyH3 Nanoparticles”
¹College of Materials Science, Beijing University of Technology, Beijing, China
²Institute of Recycling Economy, Beijing University of Technology, Beijing, China

AP31 - Roland Gau², Konrad Güth¹, Alex Buckow¹, Almut Dirks, Gert Homm¹, Armin Reller¹,², Stefan Gath¹,², Oliver Guttleisch¹,²
“Rare Earth Permanent Magnets: Options for Substitution and Recycling of Critical Metals”
¹Fraunhofer Project Group Materials Recycling and Resource Strategies IWKS, Hanau, Germany
²Department of Physics, Resource Strategy, Augsburg University, Germany
³Waste Management and Environmental Research, Justus Liebig University, Giessen, Germany
⁴Department of Material Science, Functional Materials, TU Darmstadt, Germany

AP32 - Akira Sugawara *, Takeshi Nakayama, Kazuhiro Ueda, Noriyuki Lee and Hiroyuki Yamamoto
“Magnetic hysteresis loops of micrometer-size Nd-Fe-B magnets measured using microbeam X-ray magnetic circular dichroism”
Central Research Laboratory, Hitachi Ltd., Akanuma 2520, Hatoyama, Saitama Japan

AP33 - A. H. Li, W. Li, J. J. Li, S. L. Huang, Y. C. Sun, H. B. Feng, M. G. Zhu
“Corrosion Behaviors and Mechanism of Sintered Rare-Earth Magnets”
Division of Functional Materials, Central Iron & Steel Research Institute, Beijing China

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1 MAGMA-Labmat, Department of Mechanical and Materials Engineering, UFSC - Brasil
2 Fraunhofer IFAM, Bremen – Germany

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Hitachi Metals Ltd., 2-15-17 Egawa, Shimamoto-cho, Mishima-gun, Osaka, Japan

AP36 - Q.Y. Zhou, A.R. Yan
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Iningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences

AP37 - M. W. Lee 1, D. R. Dhakal 1, T. S. Jang 1, T. H. Kim 2, S. R. Lee 2, H. J. Kim 3
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1) Department of Hybrid Engineering, Sunmoon University, Asan Republic of Korea
2) Department of Materials Science and Engineering, Korea University, Seoul Republic of Korea
3) R&D Center of Jahwa Electronics Co. Ltd, Cheongwon Republic of Korea

AP38 - Miha Zakotnik, Peter Afiuny, and Catalina O. Tudor
“Mass Production of Recycled NdFeB-type Sintered Magnets”
Urban Mining Technology Co., Perryville, MD USA
SCHEDULE
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University of Nebraska, Lincoln, NE

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Graduate School of Engineering, Nagasaki University, Bunkyo-machi 1-14, Nagasaki 852-8521, Japan

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Argonne National Laboratory, Argonne, IL USA

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IFW Dresden, Institute for Metallic Materials, Helmholtzstr. 20, D-01069 Dresden, Germany

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National Institute for Materials Science (NIMS), Sengen 1-21-1, Tsukuba, Ibaraki, Japan

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1Ningbo Institute of Material Technology & Engineering Chinese Academy of Science, Ningbo, People’s Republic of China
2Ningbo Jinji Strong Magnetic Material Company, Ningbo, People’s Republic of China

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1National Institute of Advanced Industrial Science and Technology (AIST), Nagoya, Japan
2Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM), Nagoya, Japan
10:57 – 11:09 AM – K. Löwe1, C. Brombacher2, M. Katter2, O. Gutfleisch1,3
“Temperature Dependent Dy Diffusion Processes in Nd-Fe-B Permanent Magnets”
1TU Darmstadt, Darmstadt Germany,
2Vacuumschmelze GmbH & Co., Hanau, Germany
3IWKS Hanau, Fraunhofer-Projektgruppe für Wertstoffkreisläufe und Ressourcenstrategie, Hanau, Germany

11:09 – 11:21 AM – K. Hioki1, A. Hattori, and T. Iriyama
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Daido Steel Co., Ltd., Minami-ku, Nagoya Japan

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Tohoku Gakuin University, Tagajo, Japan

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1College of Materials Science, Beijing University of Technology, Beijing, China
2Institute of Recycling Economy, Beijing University of Technology, Beijing, China

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1Powder & Ceramics Division, Korea Institute of Materials Science, Changwon, Korea
2Department of Materials Science and Engineering, Pukyong National University, Nam-Gu, Busan, Korea
3Powder & Ceramics Division, Korea Institute of Materials Science, Changwon, Korea

11:57 – 12:09 PM – Fangming Wan, Jingzhi Han, Yingchang Yang, Jinbo Yang
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State Key Laboratory for Mesoscopic Physics, and School of Physics, Peking University, Beijing China

“Microstructure and Magnetic Properties of Zn-coated (Nd,Dy,Y)-(Fe,Co)-B Ribbon Powder and Subsequent Hot Deformed Magnets” ........................................ 166
Ames Laboratory (USDOE), Iowa State University, Ames, IA USA

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2:00 – 4:00 PM Status of Permanent Magnets Around the World

2:00 – 2:22 PM – S. Constantinides
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Arnold Magnetic Technologies, Rochester, NY USA

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1Central Iron & Steel Research Institute, Beijing, China
2IEEE TC-15 Voting Member, Beijing, China
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Daido Steel Co., Ltd./Intermetallics Co., Ltd., Nagoya 457-8545, Japan

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Vacuumsmelze GmbH & Co. KG, Hanau, Germany

3:28 – 3:50 PM – A.G. Dormidonov1, A.S. Lileev2, N.V. Kudrevatikh3
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1 JSC “SPETSMAIGNIT”, Moscow, Russia; (2) National Research University “MISIS”, Moscow, Russia;
(3) Ural Federal University, Yekaterinburg, Russia

COFFEE BREAK – 15 MINUTES

4:15 – 5:50 PM Novel Synthesis and Processing Techniques

4:15 – 4:27 PM - Melania Marinescu1, Jun Cui2, Glen Grant2, Saumyadeep Jana2, Jens Darsell2, Matthew J. Kramer3, Jinfang Liu1
“Rare Earth Based Permanent Magnets Processed by Friction Consolidation and Extrusion” ................................................................. 203
1 Electron Energy Corporation, Landisville PA
2 Pacific Northwest National Laboratory, Richland WA
3 Ames Laboratory, Ames IA

4:27 – 4:39 PM – Andraz Kocjan, Spomenka Kobe and Paul McGuiness
“The Rapid Densification of Nd-Fe-B Materials Using Spark-Plasma Sintering”
Department for Nanostructured Materials, Jožef Stefan Institute, Ljubljana, Slovenia

4:39 – 4:51 PM - Ami Berkowitz1, Phi-Khanh Nguyen1 and David J. Smith2
“MnBi Single Domain Particles Produced by Spark Erosion” ................................................................. 206
1 University of California-San Diego, La Jolla, CA
2 Arizona State University, Temple, AZ

“Sintering Analysis of NdFeB Materials” ................................................................. 209
1 CEA, LITEN, 17 rue des Martyrs, F-38054 Grenoble, France
2 Univ. Grenoble Alpes, SIMAP, F-38000 Grenoble, France
3 CNRS, SIMAP, F-38000 Grenoble, France

“Effect of Internal Lubricants on Microstructure and Magnetic Properties of Sintered Nd-Fe-B Magnets Produced by PLP” ................................................................. 212
1 Institute of Metal Physics, UB of the RAS, Russia, 620990, Ekaterinburg
2 Institute of Organic Synthesis, UB of the RAS, Russia, 620137, Ekaterinburg
3 Institute of Metallurgy, UB of the RAS, Russia
4 University of Delaware, 217 Sharp Lab, Newark, DE USA
5:15 – 5:27 PM – Lopes, L.U.¹, Santos, E.C.¹, N. Uenal³, Hartwig, T.² and Wendhausen, P.A.P.¹
¹ MAGMA-Labmat, Department of Mechanical and Materials Engineering, UFSC – Brasil
²Istituto SENAI de Inovação em Laser, FIESC-SENAI-Brazil
³ Fraunhofer IFAM, Bremen – Germany

5:27 – 5:39 PM – Haibo Feng, Anhua Li, Shulin Huang, Yanfeng Li, Minggang Zhu, Weixing Xia, Wei Li “Coercivity Enhancement of the Sintered Magnets with Blending Magnetic Grains” ………………………………………………………………………………………………………………………… 218
Division of Functional Materials, Central Iron & Steel Research Institute, China Iron and Steel Research Institute Group, Beijing, P.R.China

“Mass Production of Recycled NdFeB-type Sintered Magnets and a Novel Grain Boundary Modification Process” ................................................................. 220
Urban Mining Technology, Co., Perryville, MD USA

5:55-7:25 PM Theory: Micromagnetics
5:55 – 6:17 PM – H. Kronmueller¹, D. Goll², J. B. Yang³, Y. B. Yang³, Y. Chen¹, E. Goering¹
“Micromagnetic Analysis of Hardening Mechanisms in Supermagnets” ................................................................. 226
¹Max Planck Institute for Intelligent Systems, Heisenbergstr. 3, Stuttgart, Germany
²Material Research Institute, Aalen University, Beethovenstr. 1, Aalen, Germany
³Department of Physics, State Key Laboratory for Mesoscopic Physics, Peking University, Beijing P. R. of China

6:17 - 6:39 PM – Josef Fidler, Ahmad Asali, Gregor Zickler, Peter Toson, Wolfgang Wallisch and M. Hajduga
“Ab-Initio and Micromagnetic Calculations on Permanent Magnets” ................................................................. 231
Vienna University of Technology, Institute of Solid State Physics, Wiedner Hauptstr. Vienna, Austria.

6:39 – 7:01 PM – S. Bance¹, G. Ciuta²,³, T. Shoji⁴, T. Gao³, G. Hrkač⁵, M. Yano⁶, A. Manabe⁶, N. M. Dempsey²,³, T. Schrefl¹,⁶, D. Givord¹,²,³,⁷
“Hard Magnet Coercivity” ................................................................. 236
¹ Dep. of Technology, St Pölten University of Applied Sciences, Austria
² Univ. Grenoble Alpes, Inst NEEL, Grenoble, France
³ CNRS, Inst NEEL, F-38042 Grenoble, France
⁴ Toyota Motor Corp., Toyota City, Japan
⁵ CEMPS, University of Exeter, Exeter, UK
⁶ Center for Integrated Sensor Systems, Danube University Krems, Austria
⁷ Instituto de Fisica, Universidade Federal do Rio de Janeiro, Rio de Janeiro RJ, Brasil

7:01 – 7:13 – Johann Fischbacher, Simon Bance, Thomas Schrefl
“Micromagnetics for the coercivity of composite permanent magnets” ................................................................. 241
St. Poelten University of Applied Sciences, Matthias Corvinus St. Poelten, Austria

7:13 – 7:25 PM – Aleksander L. Wysocki and Vladimir P. Antropov
“Finite Temperature Micromagnetic Simulations of Nd₂Fe₁₄B-Fe Composites”
Ames Laboratory, Ames, IA USA
7:30 BANQUET

7:30 – 8:00 PM Drinks
8:00 - 8:12 - Shuk Rashidi - "Karl Srnat Narrative"
8:12 - 9:00 – Dinner
9:00 - 9:30 - M.J.D. Coey "How Magnetism Has Changed the World - Three Times"
9:30 - 10:00 - Dessert
8:00 – 10:20 AM Non-Rare Earth Magnets I

8:00 – 8:22 AM - Jinbo Yang\textsuperscript{1,2}, Y.B. Yang\textsuperscript{1}, H. Zhao\textsuperscript{1} and Y.C. Yang\textsuperscript{1}

“Nanocrystalline MnBi with High Degree of Texture and Coercivity” .................................................. 244
\textsuperscript{1}State Key Laboratory for Mesoscopic Physics, School of Physics, Peking University, Beijing, P.R. China
\textsuperscript{2}Collaborative Innovation Center of Quantum Matter, Beijing, China

8:22 – 8:44 AM Laura H. Lewis

“Prospects of Chemically-Ordered FeNi (Tetrataenite) for Permanent Magnet Development” ................................................................. 248
Department of Chemical Engineering, Northeastern University, Boston, MA USA


“Role of the Applied Magnetic Field on the Microstructural Evolution in alnico 8 Alloys” ................................................................. 252
Ames Lab, Ames, IA USA

9:06 – 9:28 AM - Maogang Gong and Shenqiang Ren

“Templated Growth of Magnetic FeCo Nanostructures” ................................................................. 255
Department of Chemistry, University of Kansas, Lawrence, KS, USA

9:28 – 9:40 AM – S.Ener\textsuperscript{1}, K.P. Skokov\textsuperscript{1}, I. Radulov\textsuperscript{1}, H. Jian\textsuperscript{1}, M.D. Kuz’min\textsuperscript{1}, A. Edström\textsuperscript{2}, J. Rusz\textsuperscript{2}, O. Eriksson\textsuperscript{2} and O. Gutfleisch\textsuperscript{1}

“Mastering Magnetic Anisotropy by Small Substitution of 3d-5d Elements in (Fe,Co)2B Single Crystals”
\textsuperscript{1} Technische Universität Darmstadt, Institute of Materials Science, Darmstadt/ Germany
\textsuperscript{2} Uppsala University, Department of Physics and Astronomy, Uppsala/Sweden

9:40 – 9:52 AM - T. Mix\textsuperscript{1,2}, L. Schultz\textsuperscript{1,2} and T.G. Woodcock\textsuperscript{1}

“Crystal Structure and Hard Magnetic Properties of Mn-Ga Compounds” ................................................................. 259
\textsuperscript{1} IFW Dresden, Institute for Metallic Materials, Dresden, Germany
\textsuperscript{2} Department of Physics, TU Dresden, Dresden, Germany

9:52 – 10:04 AM - Toshiya Hozumi\textsuperscript{1,2}, Patrick LeClair\textsuperscript{1} and Gary Mankey\textsuperscript{1}, Takao Suzuki\textsuperscript{1}

“Magnetic Anisotropy and Coercivity Mechanism of LTP MnBi Thin Films” ................................................................. 262
\textsuperscript{1} Center for Materials for Information Technology (MINT), The University of Alabama, Tuscaloosa, AL, USA
\textsuperscript{2} Advanced Technology Development Center, TDK Corporation, Narita, Japan
9:40 – 9:52 AM - Zachary J. Huba, Kyler J. Carroll, Vincent G. Harris, Everett E. Carpenter

“Enhancing the Magnetic Properties of High Aspect Ratio Co,C particles through Post Synthetic Processing”

1Virginia Commonwealth University, Richmond, VA USA
2Northeastern University, Boston, MA USA

COFFEE BREAK – 15 MINUTES

10:45 - 12:30 AM Non-Rare Earth Magnets II

10:45 – 11:07 AM – B Zande, S Simizu, R.T. Obermyer, A Margolin and S.G. Sankar

“Review of Synthesis and Characterization of Fe16N2 Powder”

1Advanced Materials Corporation, Pittsburgh, PA
2Oak Ridge National Laboratory, Oak Ridge, TN USA


“α'-Fe16N2 compound nanoparticles - magnetic properties and magnetic reversal mechanism”

1New Industry Creation Hatchery Center, Tohoku University, Sendai, Japan
2Research and Development Division TODA Kogyo Corporation, Ohtake, Hiroshima, Japan

11:29 – 11:51 AM - Jian-Ping Wang and Yanfeng Jiang

“Fe16N2: a 40-year mystery material and its promise for next generation rare-earth-free magnet”

University of Minnesota, Minneapolis, MN USA


“Investigation on the formation of Fe16N2 iron nitride by Reactive Molecular Beam Epitaxy”

Institut für Materialwissenschaft, TU Darmstadt, Alarich-Weissstr. 2, 64287 Darmstadt, Germany

12:03 – 12:15 PM - Anja Backen, Damien Le-Roy, Ozan Akdogan, Dominique Givord, Nora M. Dempsey

“Surface anisotropy in patterned FeCo thin films”

1CNRS, Institut Néel, UPR 2940, 25 rue des Martyrs, BP166, 38042 Grenoble Cedex 9, France
2Univ. Grenoble Alpes, Institut Néel, 38042 Grenoble, France
3Instituto de Física, Universidade Federal do Rio de Janeiro, Río de Janeiro RJ, Brazil

12:15 – 12:27 PM - V.P. Menushenkov, M.V. Gorshenkov, I.V. Shetinin, E.S. Savchenko

“Microstructure evolution and magnetic properties of as-cast Fe2NiAl alloy during cooling after homogenization at a critical rate”

National University of Science and Technology “MISIS”

12:30 – 2:00 PM – LUNCHEON

2:00 – 4:00 PM SYMPOSIUM: Coercivity-Grain Boundary Phases

2:00 – 2:22 PM - K. Hono, H. Sepehri-Amin, T. Akiya, J. Liu, T. Ohkubo, K. Hioki, A. Hattori

“Dy-Free High Coercivity Nd-Fe-B Hot Deformed Magnets”

Elements Strategy Initiative Center for Magnetic Materials (ESICMM), National Institute for Materials Science (NIMS, Tsukuba 305-0047 Japan)
2:22 – 2:44 PM – T. Nakamura¹, A. Yasui¹, Y. Kotani¹, T. Fukagawa², T. Nishiuchi², H. Iwai³, T. Akiya¹, T. Ohkubo¹, K. Hono¹, S. Hiroswa³, and Y. Gohda⁴
“Magnetism of Grain-boundary Phase in Nd-Fe-B Sintered Magnets Studied with Soft X-ray Magnetic Circular Dichroism Technique”
¹ Japan Synchrotron Radiation Research Institute, 1-1-1, Kouto, Sayo-cho, Sayo-gun, Hyogo 679-5198 Japan
² Magnetic Materials Research Laboratory, NEO-MAX Div., Hitachi Metals, Ltd., 2-15-17 Egawa, Shimamoto, 618-0013, Japan
³ National Institute for Materials Science, Tsukuba 305-0047, Japan
⁴ Department of Physics, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

2:44 – 3:06 PM – Takuya Yoshioka¹, Hiroki Tsuchiura¹, and Pavel Novák²
“First-principles study on magnetization easy-axis and crystal field parameters in $R_2Fe_{14}B$ systems” .............................................................................................................................................. 276
¹ Department of Applied Physics, Tohoku University, Sendai, Japan
² Institute of Physics of ASCR, Prague, Czech Republic

3:06 – 3:28 PM – G. Hrkac¹, K. Butler³, T.G. Woodcock², T. Schrefl⁴, and O. Gutfelisch⁵,²
“Impact of different Nd-rich and Cu doped crystal-phases on the coercivity of Nd-Fe-B grain ensembles” .............................................................................................................................................. 279
¹ College of Engineering, Mathematics and Physical Sciences, Univ. of Exeter, UK
² IFW Dresden, Institute for Metallic Materials, 01171 Dresden, Germany
³ Centre for Sustainable Chemical Technologies, University of Bath, Bath, UK
⁴ St. Pölten University of Applied Sciences, Matthias Corvinus Str. 15, Austria
⁵ TU Darmstadt, Institute for Materials Science, Petersenstr. 23, Darmstadt, Germany

3:28 – 3:40 PM – A. Sakuma¹,²
“Theoretical Study on the Magnetic Properties of Nd-Rich Grain-Boundary Phase of Nd-Fe-B Magnets”
¹ Department of Applied Physics, Tohoku University, Aoba 6-6-05, Aoba-ku, Sendai 980-8579, Japan
² CREST, Japan Science and Technology Agency, Aoba 6-6-05, Aoba-ku, Sendai 980-8579, Japan

3:40 – 3:52 PM – T.G. Woodcock¹, Q.M. Ramasse², T. Shoji³, M. Yano³, A. Kato³ and O. Gutfelisch⁴
“Phase Boundaries in Hot Deformed Nd-Fe-Co-B-Ga Magnets Infiltrated with a Nd-Cu Eutectic Liquid” .............................................................................................................................................. 282
¹ IFW Dresden, PO Box 270116, 01171 Dresden, Germany
² SuperSTEM Laboratory, STFC Daresbury Campus, Daresbury, WA4 4AD, UK
³ Advanced Material Engineering Div., Toyota Motor Corporation, Susono 410-1193 Japan
⁴ Materialwissenschaft, TU Darmstadt, Alarich-Weiß-Str. 16, 64287 Darmstadt, Germany

4:15 – 5:35 PM Theory: Fundamental

4:15 – 4:37 PM – Priyanka Manchanda¹, Ralph Skomski,¹ and Arti Kashyap²
“Supercell Calculations of Magnetization, Exchange, and Anisotropy” ................................................................................................................................. 285
¹ Physics and Astronomy and NCMN, University of Nebraska, Lincoln, NE, USA,
² School of Basic Sciences, Indian Institute of Information Technology, Mandi, Himachal Pradesh, India

4:37 – 4:59 PM – O. Mryasov¹,², S. Okatov², J. Barker², S. Faleev², Yu. Gornostyrev²
“Understanding magnetization, magnetic anisotropy and their temperature dependence: manganese and iron based ferromagnets with large anisotropy”
¹ Department of Physics, University of Alabama, Tuscaloosa, USA
² MINT Center, University of Alabama, Tuscaloosa, USA
4:59 – 5:11 PM - Liqin Ke, Denys Kukusta, and Vladimir Antropov
“Analysis of magnetic anisotropy in doped Ce2Co17 magnets”
Ames Laboratory US DOE, Ames, IA USA

5:11 – 5:23 PM - Mirosław Werwinski, Jan Rusz, Alexander Edström, and Erna Delczeg-Czirjak
“Ab-initio calculations of magnetocrystalline anisotropy of FeCo special quasirandom structures with B, C or N”
Uppsala University, SE-75120 Uppsala, Sweden

5:23 – 5:35 PM - Renu Choudhary,1,2 Pankaj Kumar,1 Priyanka Manchanda,2 Yi Liu,2 Arti Kashyap,1 D. J. Sellmyer2, and Ralph Skomski2
“Atomic Magnetic Properties of Pt-Lean FePt and CoPt Derivatives”  .......................................................... 289
1 School of Basic Sciences, Indian Institute of Technology, Mandi, Himachal Pradesh, India
2 Department of Physics and Astronomy and NCMN, University of Nebraska, Lincoln, NE USA

5:35 – 7:05 PM Applications II

5:35 – 5:57 PM - T. Kondo1, Y. Asano1, A. Yamagiwa1, and K. Ohyama2
“Recent Advances in High Performance Permanent Magnet Motors”  ............................................................. 292
1 Technology Research Association of Magnetic Materials for High-Efficiency Motors, Osaka, Japan
2 Daikin Industries, Ltd. Environmental Technology Laboratory, Kusatsu, Japan

5:57 – 6:19 PM - G. Martinek1, U. Wyss2, D. Maybury2, S. Constantinides3
“Optimizing Magnetic Effects through Shaped Field Magnets”  .............................................................. 297
1 Arnold Magnetic Technologies, Donaustrasse 7, Hanau, Germany
2 Arnold Magnetic Technologies, Lupfig, Switzerland
3 Arnold Magnetic Technologies, Rochester, NY USA

6:19 – 6:41 PM - Heeju Choi and Jinfang Liu
“Numerical and Experimental Root Cause Analysis of High Speed Motor/Generators”  .......................... 300
Electron Energy Corporation, Landisville, PA USA

6:41 – 6:53 PM - Eobin Alex George1, Gaurav Tiwari2 and S. Prakash Narayan2
“High Energy Magnets to Harness Energy from Sea Waves”  ................................................................. 303
1 Yoyo Aerospace and Automation, Kochi (India)
2 Mansarovar Institute of Science & Technology (MIST), Bhopal-462042 (India)

7:00 – 9:00 PM – POSTERS

Posters B – Nanocrystalline Magnets

BP1 - Rajasekhar Madugundo, George C. Hadjipanayis #185
“Anisotropic Rare-Earth Lean Pr-Fe-B Nanocomposite Magnets”  .......................................................... 307
Physics and Astronomy, University of Delaware, Newark, DE USA

BP2 - G.Obara and K.Kusaka #77
“Magnetic Properties of Pr-Fe-Co-B System Melt-Spun Ribbons”  .......................................................... 310
School of Science and Technology, Meiji University, 1-1-1 Higashimita, Tama-ku, Kawasaki Japan

BP3 – Zhi-An Chen, Xiao-Lei Rao, E Niu, Bo-Ping Hu
“Effect of Dy/Y/Gd/Ho substitution on magnetic properties and microstructure of nanocrystalline monophase Nd-Fe-B magnets”  ................................................................. 313
Beijing Zhong Ke San Huan Research, Beijing, China
BP4 - Muhammad Asif Warsi, John Q. Xiao

“Fabrication and Magnetic Properties of Electrospun Fe$_{65}$Co$_{35}$ Nanowires and Nanotubes for Exchange Coupled Permanent Magnets” .................................................... 317
Physics and Astronomy, University of Delaware, Newark, DE USA

BP5 - M. Yue$^1$, C. G. Wang$^1$, C. Zhou$^1$, D. T. Zhang$^1$, W. Q. Liu$^1$, Q. M. Lu$^1$, Z. H. Guo$^2$, and W. Li$^1$

“Microstructure and Crystallographic Texture Evolution in Hot Deformed SMCo$_5$ Permanent Magnet” ........................................................................................................... 320
$^1$ College of Materials Science and Engineering, Beijing University of Technology, Beijing China
$^2$ Division of Functional Materials, Central Iron and Steel Research Institute, Beijing, China

BP6 - Bin Qi and David P. Arnold

“Fabrication of Size-Tunable Monodisperse Nd$_2$Fe$_{14}$B@CoFe$_2$ Nanocomplexes” ...................... 323
University of Florida, Gainesville FL USA

BP7 - F.J. Pedrosa$^1$. J.L.F. Cuñado$^{1,2}$, J. Camarero$^{1,2}$, M. Seifert$^3$, V. Neu$^3$, V. Baltz$^4$, D. Serantes$^5$, O. Chubykalo-Fesenko$^5$, R.P. del Real$^5$, M. Vázquez$^5$, L. Schultz$^3$, B. Dieny$^4$, and A. Bollero$^1$

“Unprecedented tuning of the magnitude and sign of the loop shift in orthogonally coupled SmCo$_5$ (perpendicular) / CoFeB (in-plane) bilayers”
$^1$ IMDEA Nanoscience, Madrid, Spain
$^2$ Dep. de Física Materia Condensada, Inst. Nicolás Cabrera, UAM, Madrid, Spain
$^3$ IFW Dresden, Institute for Metallic Materials, Dresden, Germany
$^4$ SPINTEC, UMR-8191 CNRS/CEA-INAC/UST-Marseille, France
$^5$ ICMM, Instituto de Ciencias de Materiales de Madrid, CSIC, Madrid, Spain

BP8 - X. Jiang$^{1,2}$, B. Balamurugan$^{2,3}$, J. E. Shield, and Yunlong Geng$^{1,2}$

“Structural and highly coercive magnetic properties of Fe modified Sm-Co nanocrystalline alloys”
$^1$ Department of Mechanical & Materials Engineering, University of Nebraska, Lincoln, NE USA
$^2$ Nebraska Center for Materials and Nanoscience, University of Nebraska, Lincoln, NE USA
$^3$ Department of Physics and Astronomy, University of Nebraska, Lincoln, NE USA

BP9 - Yoshiaki Kinemuchi$^{1,2}$, Kazuyuki Suzuki$^{1,2}$, Atsuya Towata$^{1,2}$, Masaki Yasuoka$^{1,2}$, Shusuke Okada$^{1,2}$, Kentaro Takagi$^{1,2}$ and Kimihiro Ozaki$^{1,2}$

“Synthesis of well-dispersed α-Fe$_x$N$_2$ particles” ............................................................... 326
$^1$ National Institute of Advanced Industrial Science and Technology (AIST), Nagoya Japan
$^2$ Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM), Nagoya Japan

BP10 - Daniel Salazar$^1$, J. Manuel Barandiarán$^{1,2}$, Rajasekhar Madugundo$^3$ and George C. Hadjipanayis$^3$

“Coercivity Enhancement in Nanocomposite Nd-Fe-B Alloys by Pr-diffusion” .................. 329
$^1$ BCMaterials, Camino de Ibaiizabal, Edificio 500, Planta 1. Parque Científico y Tecnológico de Zamudio, 48160 Derio, Spain
$^2$ University of the Basque Country, Faculty of Science and Technology, P.O. Box 644, 48080 Bilbao, Spain
$^3$ Department of Physics and Astronomy, University of Delaware, USA

Posters B – Grain Boundary Engineering in NdFeB Magnets

BP11 - K. M. Kim$^{(1)}$, M. A. Matin$^{(1)}$, H. W. Kwon$^{(1)}$, J. G. Lee$^{(2)}$, J. H. Yu$^{(2)}$

“Coercivity of Thermally or Mechanically Treated Nd-Fe-B-Type HDDR Material” .................. 332
$^{(1)}$ Pukyong National University, Busan, South Korea
$^{(2)}$ Korea Institute of Materials Science, Changwon, South Korea
BP12 - S. Sawatzki¹, S. Ener¹, Chr. Kübel², and O. Gutfleisch¹,³
“Effect of DyCu doping of hot-compacted and die-upset Nd-Fe-B magnets” ................................. 335
¹TU Darmstadt, Materialwissenschaft, 64287 Darmstadt, Germany
²KIT, Institute of Nanotechnology INT, 76021 Karlsruhe, Germany
³IWKS Hanau, Fraunhofer-Projektgruppe für Wertstoffkreisläufe und Ressourcenstrategie, 63457 Hanau, Germany

BP13 - Damien Le Roy¹,², Ozan Akdogan¹,², Nora Dempsey¹,², Dominique Givord¹,²,³
“Model systems for grain surface engineering in Nd-Fe-B magnets” ........................... 335
¹Univ. Grenoble Alpes, Inst. NEEL, F-38042 Grenoble, France
²CNRS, Inst. NEEL, F-38042 Grenoble, France
³Instituto de Física, Universidade Federal do Rio de Janeiro, Rio de Janeiro RJ, Brasil

BP14 - Jose Adilson de Castro¹, Daniel Rodrigues¹, Marcos Flavio de Campos³
“A Microstructural model for the Dysprosium Diffusion in NdFeB magnets from a Surface Layer”
UFF – Universidade Federal Fluminense – Volta Redonda RJ BRAZIL

BP15 - C. Brombacher*, K. Uestuener, F.-J. Boergermann, and M. Katter
“GRAIN-BOUNDARY-DIFFUSION OF PR-FE-B MAGNETS FOR CRYOGENIC APPLICATIONS” ............................... 339
Vacuumschmelze GmbH & Co. KG, Grüner Weg 37, 63450 Hanau, Germany

BP16 - G. Suppan†‡*, M. Ruehrig†, C. Brombacher§, M. Katter§,
“Grain Boundary Diffusion in Nd-Fe-B Permanent Magnets using an Electrochemical HRE Deposition Process” ................................................................. 342
†Institute of Physical and Theoretical Chemistry, University of Regensburg, Germany,
‡Siemens AG, Erlangen, Germany, §Vacuumschmelze GmbH & Co. KG, Hanau, Germany

BP17 - Pan Shuming Li Shouyi*** David Wong*** Liu jinfang Li Zhengwen**
MaRuzhang** Pan Feng
“The Development, Process and Prospect of Rare Earth Permanent Magnetic Materials” ............ 345
General Research Institute for Non-ferrous Metals, Beijing, China
***Feller Magnets Corporation
**Beijing University of Science and Technology, Beijing, China

BP18 - B. Z. Cui*, M. Marinescu, J. F. Liu
“Sintered magnets of HDDR Nd-Fe-B powders with artificial R-Cu grain boundary phases” ....... 346
Electron Energy Corporation, Landisville, PA USA

BP19 - E. Niu,¹,² Z.A. Chen¹ G.A. Chen,¹,³ Y.G. Zhao,¹,³ J. Zhang,¹,³ X.L. Rao¹ B.P. Hu¹
and Z.X. Wang¹,²
“The mechanism of coercivity in sintered R-Fe-B magnets based on misch-metal” ...................... 349
¹Beijing Zhong Ke San Huan Research, Beijing China
²Institute of Physics, Chinese Academy of Sciences, Beijing China
³Sanvac (Beijing) Magnetics Co., Ltd., Beijing China

BP20 - Kristina Žagar, Sašo Šturm, Paul McGuiness, Spomenka Kobe
“Core-shell microstructure of RE-Fe-B grains to achieve maximum coercivity: HRTEM investigations”
Jozef Stefan Institute
Posters B – Theory – Micromagnetics

BP21 - Alexander Edström, Erna Delczeg-Czirjak, Miroslaw Werwinski, Jan Rusz, and Olle Eriksson
“Stable tetragonal distortions and significantly increased magnetocrystalline anisotropies in FeCo alloys with C or B doping”
Department of Physics and Astronomy, Uppsala University, Uppsala, Sweden

BP22 - Marcos Flavio de Campos1, Daniel Rodrigues1, Jose Adilson de Castro1
“On the suitability of micromagnetics for phases with high magnetocrystalline anisotropy”
UFF – Universidade Federal Fluminense – Volta Redonda RJ BRAZIL

BP23 - Jamileh Beik Mohammadi1,2, Andrew Tuggle1,2, Claudia K.A. Mewes1,2, Tim Mewes1,2, Takao Suzuki1,3
“Micromagnetic Simulations to Optimize the Energy Product of Hard/Soft Nanocomposites”
1 Center for Materials for Information Technology, University of Alabama, Tuscaloosa
2 Department of Physics and Astronomy, University of Alabama, Tuscaloosa
3 Electrical & Computer Engineering, Metallurgical and Materials Engineering, University of Alabama, Tuscaloosa

BP24 - P. Kharel1, R. Skomski2, P. Manchanda2, Y. Huh1, A. Nelson1, V. R. Shah2, G. C. Hadjipanayis2, and D. J. Sellmyer2
“Anisotropy and Micromagnetism of Heusler Alloys”
1 Department of Physics, South Dakota State University, Brookings, SD USA
2 Department of Physics & Astronomy and NCMN, University of Nebraska, Lincoln, NE USA

BP25 - Marcos Flavio de Campos1, Fernanda A. Sampaio da Silva1, Daniel Rodrigues1, Jose Adilson de Castro1, Sergio A. Romero2, Suzilene Real Janasi3
“Applicability of the SW-CLC Model”
1 UFF – Universidade Federal Fluminense – Volta Redonda RJ BRAZIL
2 IFUSP – Universidade de São Paulo – São Paulo SP BRAZIL
3 BRATS - Cajamar SP BRAZIL

Posters B – Novel Synthesis and Processing

BP26 - M. Farr, A. Campbell, I. R. Harris, A. Bradshaw, R. S. Sheridan, V. S. Mann and A. Walton*
“The effect of Ni impurities on HDDR processing of scrap sintered NdFeB magnets” .......................... 352
School of Metallurgy and Materials, University of Birmingham, Edgbaston, Birmingham, UK

BP27 - R. S. Sheridan, V. S. J. Mann, A. Bradshaw, I. R. Harris, and A. Walton
“The development of microstructure during HDDR treatment of sintered NdFeB-type magnets” ................................................................. 355
School of Metallurgy and Materials, University of Birmingham, Edgbaston, Birmingham, UK

BP28 - Jose Adilson de Castro1, Daniel Rodrigues1, Marcos Flavio de Campos2
“From Neodymium oxide to NdFeB Alloy: An overview on the reduction methods” .......................... 358
1 PUVR– Federal Fluminense University, Volta Redonda, Rio de Janeiro, Brazil
2 BRATS - Sintered Filters and Metallic Powders, Cajamar, São Paulo, Brazil

BP29 - Rikio Soda*, Misaho Akada**, Kenta Takagi*, Kimihiro Ozaki*
“Development of particle-Based Simulation for magnetic-aligned compaction process” ......................... 361
* National Institute of Advanced Industrial Science and Technology (AIST)
** Technology Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM)
BP30 - O.A. Golovnia1, A.G Popov1, A.N. Sobolev2, G.C. Hadjipanayis3

“SIMULATION OF THE MAGNETIC ALIGNMENT OF UNIAXIAL MAGNETIC POWDERS IN PLP TECHNOLOGY” ................................................................. 364
1Institute of Metal Physics, Russia, 620990
2FSBEI HPO «SUSU», Russia, 454080
3Department of Physics and Astronomy, University of Delaware, Newark, DE USA

BP31 - Yikun Fang, Zhiying Liu, Wei Sun, Hongsheng Chen, Minggang Zhu, Wei Li

“CFD simulation of flow dynamics of fluidized bed jet mills used for rare-earth permanent magnet powders”
Division of Functional Materials Research, Central Iron and Steel Research Institute, Haidian, Beijing China


1Baikov Institute of Metallurgy and Materials Science, Russian Academy of Sciences, Leninski pr., 49, Moscow, Russia
2“JSC SPETSMAGNIT”, Dmitrovskoe sh. 58, Moscow, Russia
3Vysoka Skola banska - Technical University of Ostrava, 70833, Czech Republic, Ostrava-Poruba

BP33 - W.Kaszuwara1, T.Giżyński1, M.Leonowicz1, M.Kulczyk2, P.Pawlik3

“Cold Hydrostatic Extrusion of Nd-Fe-B Powder” ....................................................................................... 370
1Warsaw University of Technology, Faculty of Materials Science and Engineering, Woloska Warsaw, Poland
2Institute of High Pressure Physics, Polish Academy of Sciences, Warsaw, Poland
3Czestochowa University of Technology, Faculty of Materials Processing Technology and Applied Physics, Czestochowa, Poland

BP34 - Haibo Feng*, Anhua Li, Shulin Huang, Yanfeng Li, Minggang Zhu, Wexing Xia, Wei Li

“Coercivity Enhancement of the Sintered Magnets with Blending Magnetic Grains” ............................... 373
Division of Functional Materials, Central Iron & Steel Research Institute, China Iron and Steel Research Institute Group, Beijing 100081 China

BP35 - N.V. Rama Rao, G.C. Hadjipanayis

“Hot deformed Pr-Fe-Cu(Ga)-B magnets with MgGa additive”
Department of Physics and Astronomy, University of Delaware, Newark, DE USA

BP36 - M. Parans Paranthaman1, Huseyn Ucar1, David S. Parker1, M. A. McGuire1, Brian C. Sales1, Cajetan I Nebbedim2 and R. W. McCallum2

“Selective Surface Modification of NdFe14B Permanent Magnets”
1Oak Ridge National Laboratory, Oak Ridge, TN USA
2Ames Laboratory, Ames, IA USA
8:00 – 10:30 AM Worldwide Consortia on Permanent Magnets

8:00 – 8:22 AM – Satoshi Hirosawa
“Elements Strategy toward High-Performance Permanent Magnets free from Critical Elements” ................................................................. 375
Director, Elements Strategy initiative Center for magnetic Materials, National institute for Materials Science, Tsukuba Japan

8:22 – 8:44 AM – J Cui1, J P Choi1, G Li2, E Polikarpov1, M Bowden2, M J Kramer3, M Marinescu4, S Ren5, and J P Liu6
“Development of MnBi Based Permanent Magnet: Powder Synthesis and Bulk Fabrication” ......................................................... 380
1 Pacific Northwest National Laboratory, Richland, WA USA
2 Environmental Molecular Sciences Laboratory, Richland, WA USA
3 Ames Laboratory/U.S. Department of Energy, Ames, IA USA
4 Electron Energy Corporation, Landisville, PA USA
5 University of Kansas, Lawrence, KS USA
6 University of Texas at Arlington, TX USA

8:44 – 9:06 AM – Francis Johnson, Min Zou, Wanming Zhang, Mohammed Haouaoui
“Exchange-Coupled Nanocomposite Permanent Magnets Using a Bottom-up Approach” ........................................................... 384
Ceramic and Metallurgy Technologies, GE Global Research, Niskayuna, NY USA

9:06 – 9:28 AM – G. Giannopoulos1, C. Sarafidis1, M. Gjoka3, L. Reichel1,2, A. Markou1, W. Wallisch4, V. Psycharis1, J. Fidler4 and D. Niarchos1
“Rare Earth Free Permanent Magnets” ........................................................................................................................................ 388b
1 INN, NCSR Demokritos, Athens Greece
2 IFW Dresden, Dresden, Germany
3 TU Dresden, Institute for Materials Science, Dresden, Germany
4 Vienna University of Technology, Institute Solid State Physics, Vienna, Austria

9:28 – 9:50 AM – Spomenka Kobe & ROMEO Consortium
“Replacement and Original Magnet Engineering Options – ROMEO - a European concerted effort”

9:50 – 10:12 AM – Takao Suzuki9, Toshiya Hozumi8, b, Siqian Zhao8, Patrick LeClair3 and Gary Mankey9
“Rare-Earth Free High Magnetic Anisotropy Materials -Temperature Dependence of Magnetic Anisotropy” .................................................................................................................. 393
G8 Initiative “High Performance Permanent Magnets sustainable for Next Generation”
9 Center for Materials for Information Technology (MINT) The University of Alabama, Tuscaloosa, AL USA
b Advanced Technology Development Center, TDK Corporation, Narita, Japan
10:12 – 10:34 AM – A. Bollero
“NANOPYME Project: In the Search of improved Rare Earth-Free Permanent Magnets” ................................................................. 398
IMDEA Nanoscience, Madrid, Spain

COFFEE BREAK – 15 MINUTES

10:45 – 12:30 PM – Nanocrystalline Magnets

“Dy-free, Reduced Nd, High Performance Nd2Fe14B-based Permanent Magnets” ................................................................. 403
The Ames Laboratory, Iowa State University, Ames, IA USA
a Also Department of Materials Science and Engineering
b Present address: Department of Physics, Miami University, Oxford, OH USA
c Molycorp Magnequench, Magnequench Technology Center, Singapore
d MEDA Engineering and Technical Services, Southfield, MI USA

10:57 – 11:09 AM – H. Sepehri-Amin1, T. Ohkubo1, K. Hono1, K. Guth2, and O. Gutfleisch2,3
“Anisotropy inducement mechanism in hydrogen disproportionation desorption recombination processed Nd-Fe-B powders” ................................................................. 406b
1 Elements Strategy Initiative Center for Magnetic Materials, NIMS, Tsukuba, Japan
2 Fraunhofer ISC Projektgruppe IWKS, Germany
3 Materialwissenschaft, Technische Universität Darmstadt, Germany

“SmCo-based Dual-phase Nanocomposite Bulk Permanent Magnets” ................................................................. 409
GE Global Research Center, Niskayuna, NY USA

11:21 – 11:33 AM - D.S. Neznakhin1, A.S. Volegov1, P.E. Markin1,2, S.V. Andreev1, A.S. Bolyachkin1, N.V. Kudrevatykh1
“Low Temperatures Magnetization Reversal Process in Nd-Fe-B Nanostructured Alloys” ............... 412
1 Ural Federal University, Ekaterinburg, Russia
2 Institute of Metal Physics UB RAS, Ekaterinburg, Russia

11:33 – 11:45 AM – S. Mican1, R. Hirian1, O. Isnard1, I. Chiciană1, V. Pop1,2
“Effect of Milling and Annealing Conditions on the Interphase Exchange Coupling of Nd2Fe14B/a-Fe Magnetic Nanocomposites” ................................................................. 415
1 Faculty of Physics, Babeș-Bolyai University, 400084 Cluj-Napoca, Romania
2 Institut Néel, CNRS, Université Grenoble Alpes, BP 166X, 38042 Grenoble, Cédex 9, France
3 CNRS, Institut Néel, Grenoble, F 38042, France
4 Materials Sciences and Engineering Dept., Technical University of Cluj-Napoca, Cluj-Napoca, Romania

11:45 - 11:57 AM – E. Anagnostopoulou1, B. Grindi1, M. Pou Thomis1, L.-M. Lacroix,1 F. Ott,1 G. Viau1
“From high aspect ratio nanoparticles synthesis to nano-structured permanent magnets” ............. 418
1 Université de Toulouse, LPCNO, UMR 5215 INSA-CNRS-UPS, Toulouse, France
2 Lab. Léon Brillouin UMR 12 CE/ CNRS Centre d'Etudes de Saclay France

11:57 – 12:09 PM – S. Prakash Narayan1, Takashi Yani2 and Hirotoshi Fukunaga2
“Texture development in Nanocomposite Nd-Fe/B/aFe Rare Earth Magnets” ................................................................. 421
1 Mansarover Institute of Science & Technology (MIST), India
2 University of Tsukuba, Japan
12:09 – 12:21 PM – Tetsuji Saito, Seiichi Saito, and Daisuke Nishio-Hamane
“Magnetic properties of Sm5Fe17 melt-spun ribbons and their nitrides” ................................. 424
1 Department of Mechanical Science and Engineering, Chiba Institute of Technology, Narashino, Chiba, Japan
2 Institute for Solid State Physics, The University of Tokyo, Kashiwa, Chiba, Japan

12:21 – 12:33 PM - Frederick E. Pinkerton, Jan F. Herbst, Martin S. Meyer, Daad Haddad, Chen Zhou, and Eric Poirier
“Exploring New Ce-Fe-Based Permanent Magnet Materials” ......................................................... 427
1 General Motors Research and Development Center
2 MEDA Engineering and Technical Services, LLC

2:00 – 4:00 PM Hard Magnetic Particles

2:00 – 2:22 PM – Balamurugan Balasubramanian, Bhaskar Das, Pinaki Mukherjee, and David J. Sellmyer
“Development of Nanoparticle-Based Permanent-Magnet Materials: Challenges and Advances” ................................................................. 429
Nebraska Center for Materials and Nanoscience & Department of Physics and Astronomy, University of Nebraska, Lincoln, NE USA

“Synthesis and Processing of Hard Magnetic Nanoparticles” .......................................................... 433
Department of Physics, University of Texas at Arlington, Arlington, TX USA

“Submicron Rare Earth-Cobalt Particles with Improved Hard Magnetic Properties” .................. 437
Physics and Astronomy, University of Delaware, Newark, DE USA

*College of Materials Science and Engineering, Beijing University of Technology, Beijing, China
bDivision of Functional Materials, Central Iron and Steel Research Institute, Beijing, China

3:28 – 3:50 PM – Yingchang Yang
“Submicron Sm-Fe-N Magnet Powders with High Coercivity” ..................................................... 442
Peking University, Beijing China

3:50 – 4:02 PM – Bovda O. M., Bovda V. O., Onischenko L.V., Shykhailo P.M., and Ostrovskii I. M.
“Nd-Fe-B nanoparticles prepared by cryomilling” ................................................................. 442
1 National Scientific Center, Kharkiv Institute of Physics and Technology (NSC KIPT), Ukraine
2 Polus-N LLC, Ukraine

COFFEE BREAK – 15 MINUTES

xxix
4:15 – 6:30 PM SYMPOSIUM – SEARCH FOR NEW HARD MAGNETIC MATERIALS

4:15 – 4:37 PM - **C. Z. Wang**,1,2, X. Zhao1,2, M. C. Nguyen1,2, L. Q. Ke3, W. Y. Zhang3, M. J. Kramer1,4, D. J. Sellmyer3, X. Z. Li3, V. P. Antropov1, F. Zhang1, and K. M. Ho1,2

“Predicting the Crystal Structures of Magnet Materials Using Adaptive Genetic Algorithm” .................................................................................................................................................................................. 446

1Ames Laboratory – US Department of Energy, Ames, IA USA
2Department of Physics and Astronomy, Iowa State University, Ames, Iowa, 50011, USA
3Nebraska Center for Materials and Nanoscience and Department of Physics and Astronomy, University of Nebraska, Lincoln, NE
4Department of Materials Science and Engineering, Iowa State University, Ames, IA USA

4:37 – 4:59 PM - Claudia Felser, Rolf STINSHOF, Stanislaw CHADOV, Guido KREINER, Ajaya K. NAYAK

“Tetragonal Heusler Compounds for Permanent Magnets”

Max Planck Institute of Chemical Physics for Solids, Dresden, 01187 Dresden, Germany

4:59 – 5:21 PM - Duane D. Johnson1,2, Aftab Alam3, Arjun Pathak,1 V. Pecharsky,1,2 Karl Gschneidner, Jr.,1,2 and R.W. McCallum1,2

“Better (non)Rare-Earth Magnets – Using DFT as a Computational Design Tool for Replacing Critical Materials” ........................................................................................................................................................................................................................................... 450

1Division of Materials Science & Engineering, Ames Laboratory, 311 TASF, Iowa State University, Ames, IA USA
2Department of Materials Science & Engineering, Iowa State University, Ames, IA USA
3Department of Physics, Indian Institute of Technology, Bombay, Powai, Mumbai, India

5:21 – 5:43 PM – Biplab Sanyal

“Realizing high moment materials by combining rare earth and transition metals”

Department of Physics and Astronomy, Division of Materials Theory, Angstromlaboratoriet, Uppsala University, Uppsala, SWEDEN


“New Rare Earth Lean Permanent Magnets by the Application of High-Throughput Methods” ........................................................................................................................................................................................................................................... 454

Aalen University, Materials Research Institute, Beethovenstr. 1, Aalen, Germany

6:05 – 6:27 PM - Ichiro Takeuchi

“Combinatorial Investigation of New Permanent Magnet Materials”

Department of Materials Science and Engineering, University of MD, College Park, MD USA

6:30 – 6:45 PM – CLOSING REMARKS