Soft Magnetic Materials 21

Under the High Patronage of the President of the Hungarian Academy of Sciences

Conference Program And Book of Abstracts

Organised by

Wigner Research Center for Physics,

Institute for Solid State Physics and Optics

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Welcome

The 21st Soft Magnetic Materials Conference (SMM 21) takes place in the Main Building of the Hungarian Academy of Sciences, Budapest, from September 1 to 4, 2013. This biannual Conference series, first established in 1973, provides a forum for discussion on properties and applications of soft magnets through a broad range of topics such as electric steels, amorphous and nano-crystalline alloys, low field magneto-caloric and ferromagnetic shape memory alloys, etc. Soft magnets have become a key component in a large variety of electrical and electronic devices and have also gained a significant commercial relevance.

The SMM 21 Conference will bring together industrialists and academic scientists and the emphasis is on free and informed discussion. One of the major goals of the Conference is to survey the present status of competing materials and the foreseeable evolution of related technologies. The conference offers an exciting technical program, with fourteen invited key-note speakers and twenty contributed oral presentations, arranged in traditional single plenary session, as well as about 300 poster presentations and seven exhibitors will present their products and testing equipments.

The panel discussion organized on Tuesday afternoon will offer a spontaneous "brain storming" revealing the open questions concerning the induced anisotropies by magnetic and stress annealing.

Budapest is the Capital of Hungary, is a foremost cultural and technological center, renowned for its beautiful townscape on the both side of the Danube River, universities and research institutions, museums, superb wines and cuisine. The venue of the conference is centrally located and surrounded by the major historical and cultural attractions of the city, with a wide choice of hotels, restaurants and shops within walking distance.

My best wishes for an exciting conference.

Lajos K. Varga

SMM 21 Conference Chair

List of invited lecturers

A1-01. **Giselher Herzer**, Vacuumschmelze GmbH, Germany :
"Creep induced anisotropy in nanocrystalline Fe-based alloys"

A1-02. **R. Valenzuela** S. Ammar, A.M. Bolarin-Miro, F. Sanchez de Jesús, F. Mazaleyrat, University Mexico, Mexico:
" Magnetic properties of nanostructured spinel ferrites"

A1-03. **G. Durin**, INRIM, Torino:
"Domain wall dynamics in soft magnets: Universal features from ribbons to nanostrips"

A1-04. **B. Barry Narod**, Narod Geophysics Ltd., Vancouver, Canada:
"The origin of the noise and hysteresis in permalloy ring-core fluxgate sensors"

A1-07. **R. Hasegawa**, Metglas, Inc. Conway, USA:
"Induced magnetic anisotropy in amorphous ferromagnetic alloys"

A1-08. **Mihai Stoica**, IFW Dresden, Germany:
" Fe based Bulk Metallic Glasses, properties and possible applications"

A2-01. **Martin Ferch**, Magnetec GmbH, Langenselbold, Germany:
"Application examples of nanocrystalline inductive components in todays power electronic systems"

A2-02. **Ivan Skorvanek**, Institute Exp. Physics, SAS, Kosice, Slovakia:
"Soft magnetic components with tunable magnetocaloric properties"

A2-03. **A.J. Moses** and P.I. Anderson, Univ. Cardiff, UK:
"Origins and some approaches to reduction of acoustic noise emitted from power transformer cores on no-load"

A2-10. **Oleg Heczko**, Institute of Physics, Prague, Czech Republic:
"Magnetically induced structural reorientation and highly mobile twin boundary in magnetic field"

A3-01. **R. Grossinger**, N. Mehboom, and M. Antoni, Technical University of Vienna, Austria:
"Frequency dependence of the hysteresis loop of soft magnetic materials"

A3-02. Vijay K. Shirastava and **Ratnamala Chatterjee**, I.I.T. Delhi, New-Delhi, India:
"Ferromagnetic shape memory alloys: Development and Challenges".

A3-03. **D.I. Beke**, L. Daroczi, Zs. Molnar, G. Eszenyi, University Debrecen, Hungary:
„Magnetic noises in Finemet n-type amorphous and Ni2MnGa shape memory alloys"

A3-04. **F. Landgraf**, Escola Politecnica da USP, Brasil:
"Microstructure and magnetic properties in non-oriented electrical steels"

A3-09. **T. Wackerle**, R. Batonnet, T. Wery and F. Petit, Aperam Alloys, IMPHY, France:
"Fully processed Fe-Co soft magnetic laminations for high speed electrical machines"

A3-10. **F. Mazaleyrat**, ENS, Cachan, France:
"High magnetic moment of Fe-Co nanoparticles produced in polyol medium"

Exhibition

SMM21 promotes the presence of companies and institutes at the conference through a specific exhibition program. The exhibition will be held in the room D, and will be open Monday, Tuesday and Wednesday in parallel to oral and poster sessions. The exhibition will be removed on Wednesday afternoon.

List of exhibitors

1. Vacuumschmelze, GmbH
2. Aperam Alloys, IMPHY
3. Laboratorio Elettrofisico Engineering srl,
4. Magnetec Ungarn. Kft
5. Araconsys kft. (Flux-Map NDT equipment)
6. Metal Electro Measuring technique kft (Barkhausen noise tester)
7. Wigner RCP, Institute for Solid States and Optics (simultaneous DTA and TMAG)
8. Technical Univ Budapest (MASAT-1, Hungarian satellite)

Publications

Conference related papers will be published in the April 2014 issue of IEEE transaction of Magnetics. Contributed papers are limited to 4 journal pages and invited papers to 7 journal pages.

Submission of manuscripts for publication is optional. On the other hand participation at the conference does not guarantee that the manuscript will be accepted for publication.

Manuscript review standards will mirror those used for regular articles in IEEE transaction on Magnetics. The final decision about paper acceptance/rejection is made by the SMM21 Editors, based on two peer reviews and on final Editor assessment of manuscript overall technical quality. A non-negligible rejection rate is anticipated due to severe reviewer process, even though no budgeted constraints will be applied by the organizers.

The conference editors will be available during the days of the conference for information about submitted manuscripts in the Publication room. Editor availability times will be posted at the Publication room entrance the first day of the conference.

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Technical codes:

A - Invited, oral presentation

B - Basic problems, magnetization problems, micromagnetics

C - Grain-oriented and non-oriented and high-silicon electrical steels

D - Fe-Ni, Fe-Co and soft ferrites

E - Amorphous and nanocrystalline alloys

F - Low dimensional materials: powder cores, thin films, wires, novel and special materials

G - Material and circuit behavior: analysis and modelling of induction, eddy currents, losses noise

H - Magnetic measurements and instrumentation

M - Transformers, motors, actuators, and other power applications

N - Sensors, high-frequency and electronic applications

Tuesday, September 3

B2-01 A Dynamic Magnetization Model Of Conducting Non-Oriented Ferromagnetic Steel Sheets
S. Steentjes, S. E. Zirka, Y. I. Moroz, E. Y. Moroz, and K. Hameyer, Senior Member IEEE

B2-02 Ferromagnetism in (Co,Cu)- codoped ZnO from first principles
Byung-Sub Kang, Kwang-Pyo Chae, The-Long Phan, Kyeong-Sup Kim, and Seong-Cho Yu

B2-03 Tailoring The Exchange Bias In FeNi/FeMn Bilayers By Heat Treatment And FeMn Surface Oxidation
A. V. Svalov1,2, P. A. Savin2, V. N. Lepalovskij2, A. Larrañaga3, V. O. Vas'kovskiy2, A. Garcia Arribas1,4, G. V. Kurlyandskaya1,2

B2-04 Experimental Determination of Chua Type Model Parameters For Electrical Steel Magnetic Hysteresis Representation
Branko Koprivica, Alenka Milovanovic, Milic Djekic

B2-05 Micromagnetic Modeling Of The Magneto-Mechanical Behaviour
F. Mballa Mballa, O. Hubert, S. He, S. Depeyre, P. Meilland

B2-06 Simulation of Magnetic Oscillations in a system of two MTJs with a shared free layer
A. Makarov, V. Sverdlov, D. Osintsev, and S. Selberherr

B2-07 Macroscopic Magnetization Modeling Using Assembly Of Simpified Domain Structure Models
Tetsuji Matsuo, Chikara Kaido

B2-08 A Phenomenological Hysteresis Modeling Based On Asymmetric Transition Probability Of Magnetization
Chahn Lee, Kenji Miyata, Chikara Kaido, Tetsuji Matsuo

B2-09 Influence Of Stresses On Magnetic B-H Characteristics Of $X_{30}Cr_{13}$ Corrosion Resisting Martensitic Steel
Dorota Jackiewicz, Roman Szewczyk, Jacek Salach, Adam Bieńkowski

B2-10 Application Of Jiles-Atherton Model For Modelling Magnetization Characteristics Of Textured Materials Magnetized In Easy Or Hard Axis
Roman Szewczyk

B2-11 First Principle Structural Simulation of Soft Magnetic FeSiB(PCu) Amorphous/Nano-Crystalline Alloy
Yaocen Wang, Masahiko Nishijima, Akihiro Makino, Yoshiyuki Kawazoe

Tuesday, September 3

G2-01 Influence Of Measurement Conditions On Magnetic Barkhausen Noise Response
Oleksandr Stupakov

G2-02 Frequency dependency of nonlinear loss parameter for an improved iron loss prediction
D. Eggers, S. Steentjes, and K. Hameyer

G2-03 Novel Core Loss Calculation Method For Mid-Frequency 3-Phase High Power Transformers Considering Spatial Flux Distirbution
Edris Agheb, Abbas Lotfi, Hans K. Hoidalen

G2-04 GMR-Based MFL Probe With Radial Magnetization To Estimate The Crack Orientation In Steel.
J. Aguila-Muñoz, J. H. Espina-Hernández, J. A. Pérez-Benitez, F. Caleyo, J. M. Hallen

G2-05 Analysis Of Transition Regions Between Different Processes Of Magnetic Barkhausen Noise In API Steels
P. Martínez-Ortiz, J.A. Pérez-Benítez, J. H. Espina-Hernández, F. Caleyo, J.M. Hallen, N. Mehboob and R. Grössinger

G2-06 Effects Of Wound Toroidal Core Dimensions On Measured Specific Power Loss In Electrical Steel
Branko Koprivica, Alenka Milovanovic, Jeroslav Zivanic

G2-08 Analysis Of A Transverse Flux Induction Heating System With Distributed Spiral Coils For Heating Moving Strips
Junhua Wang,, Jiangjun Ruan, Kaipei Liu, Yadong Fan, Mingui Sun

G2-09 Witricity Charger Design With FEM Simulation And Corresponding Experiment Verification For Rechargering The DBS
Junhua Wang,, Kaipei Liu, Jiangjun Ruan, Yadong Fan, Mingui Sun

G2-10 Experimental Study On The Composite Heat Transfer Coefficient Of The Bus-Bar Surface In High Voltage Switchgear
Y. D. Fan, J.G. Wang, B. Z. Wang, M. Zhou, J. W. Jiang , L. Zhao, S.H. Duan

G2-11 Effect Of Magnetic Domain Refinement On Barkhausen Noise Of Large Grain High Permeability Oriented Electrical Steel
Nkwachukwu Chukwuchekwa, Anthony J. Moses and Philip I. Anderson

G2-12 Non-Destructive Testing Of Cylindrical Ferromagnetic And Non-Magnetic Materials Using Eddy Current Tomography
Jacek Salach, Roman Szewczyk

G2-06

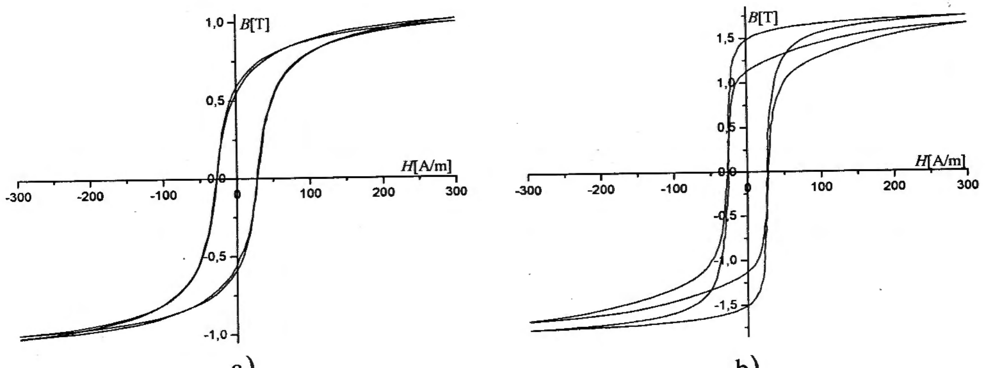
EFFECTS OF WOUND TOROIDAL CORE DIMENSIONS ON MEASURED SPECIFIC POWER LOSS IN ELECTRICAL STEEL

Branko Koprivica*, Alenka Milovanovic*, Jeroslav Zivanic*

Department of Electrical and Electronic Engineering, Faculty of Technical Sciences Cacak, University of Kragujevac, Svetog Save 65, 32000 Cacak, Serbia

Wound toroidal cores, made of electrical steel sheet, have been widely used in characterization of this kind of magnetic material. Even so, when it comes to determination of the magnetic characteristics of these materials this kind of sample is still not accepted by standards. The reason is evident influence of the sample dimensions in the measurement results. So, for a variety of dimensions of the sample different measurement results could be obtained. Some specific cases have been analyzed earlier [1-3]. The results presented and the discussion led to general conclusions that are not easily applicable in practice. Based on this research, we performed a new research in order to perform a more detailed examination of individual effects. Some results, already presented in [4], show that there is no such effects, found in [1-3], when the tests are performed on unannealed samples, Fig. 1a. However, it is clear that the magnetic properties of the material are significantly changed due to mechanical stresses in these unannealed samples. The aim of this paper is to present the results of measurements obtained with the same samples after annealing, because the difference in the measured results has been obtained, Fig. 1b. Also, by using a simple mathematical expressions, change in the measured results, *eg* the shape of hysteresis loop or the specific power loss, will be correlated to the dimensions of the sample.

The change in the hysteresis loop for same group of samples before and after annealing is presented in Fig. 1.



a) b)

[1] MOSES, A.J. – LING, P.C.Y.: Physica Scripta, **40,** (1989) 249.
[2] GRIMMOND, W. – MOSES, A.J. – LING P.C.Y.: IEEE Trans. Magn., **25,** (1989) 2686.
[3] SAITOH, K. – SHINYA, K. – MIYAZAWA E.: Electr. Engin. Japan, **129,** (1999) 1.
[4] KOPRIVICA, B. – MILOVANOVIC, A.: Intern. Scient. Conf. UNITECH '12, 16 – 17 Nov. 2012, Gabrovo, Bulgaria, **1,** 64.

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