

NAME: Jan Marek MICHALIK

DATE AND PLACE OF BIRTH: 24/01/1980 in Cracow (Poland)

ADDRESS: Solid State Physics Department, Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, al. Mickiewicza 30, 30-059 Kraków, Poland

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DEGREES:

- MSc Eng. obtained at AGH – University of Science and Technology, Faculty of Physics and Nuclear Techniques (Cracow, Poland) on July 26th, 2004. (Homologated by Spanish Ministry of Education and Science as *Licenciado de Física* (BSc) on October 5th, 2005); Overall grade: 4.5
- DEA obtained at University of Zaragoza (Zaragoza, Spain) with academic grade mark *Sobresaliente* on September 14th, 2006
- PhD by University of Zaragoza (Zaragoza, Spain) with academic grade mark *Sobresaliente Cum Laude*
- PhD by AGH – University of Science and Technology (Cracow, Poland)

SCIENTIFIC BACKGROUND

- 2004 – 2009: PhD student at University of Science and Technology – AGH in Cracow (Poland) and (from 2005) PhD student at University of Zaragoza (Spain). Supervisors Prof. Dr. Hab. Cz. Kapusta and Dr. J. M. De Teresa Nogueras. Title: "Structural, magnetic and electronic properties of the Re-based double perovskites". Mark: "Sobresaliente Cum Laude".
- 1999 – 2004: Physics Studies at the University of Mining and Metalurgy – AGH in Cracow (Poland) with specialization in Solid State Physics. Title: "Hyperfine interactions in the ¹¹⁹Sn nucleus in the La_{1-x}Ca_xMn_{0.99}¹¹⁹Sn_{0.01}O₃ manganite investigated by the Mossbauer spectroscopy". Mark: "4.5"

WORK EXPERIENCE

- 10.2014 – present: Solid State Physics Department, Faculty of Physics and Applied Computer Science, AGH University of Science and Technology (Kraków, Polska)
- 03.2013 – 09.2014: Laboratory of Advanced Microscopy – LMA, Institute of Nanoscience of Aragón, University of Zaragoza (Zaragoza, Spain)
- 05.2011 – 02.2013: Non-permanent researcher at the Institute of Materials Science of Aragón, Universidad de Zaragoza – CSIC (Spain), INNPACTO IPT-010000-2010-002 "Desarrollo y puesta en mercado de biosensores inmunomagnéticos con cuantificación mono y multiple analito (BIM)";
- 10.2009 – 04.2011: Non-permanent researcher at the Instituto Universitario de Investigación en Nanociencia de Aragón, University of Zaragoza (Spain)
- 09.2009 – 08.2010: Non-permanent researcher at the University of Science and Technology – AGH in Cracow (Poland)

PUBLICATIONS

Currently I hold (as an author or a co-author) seventeen publications. Below the list of published papers is enclosed. Those publications have been cited 156 times so far according to *ISI Web of Science* ($h=8$).

- [1] J. M. Michalik, J. M. De Teresa, D Serrate, J. Blasco and M. R. Ibarra, *Steric effects and electron doping in Sr₂CrReO₆ double-perovskite oxides*, Journal of Magnetism and Magnetic Materials **316**, 413-6 (2007)
- [2] J. M. Michalik, J. M. De Teresa, C. Ritter, J. Blasco, D. Serrate, M. R. Ibarra, C. Kapusta, J. Freudenberger and N. Kozlova, *High-field magnetization measurements in Sr₂CrReO₆ double perovskite: Evidence for orbital contribution to the magnetization*, Europhysics Letters **78**, 17006 (2007)
- [3] J. Blasco, J. M. Michalik, J. García, G. Subías and J. M. De Teresa, *Effects of the lanthanide addition to the Sr₂CrReO₆ double perovskite*, Physical Review B **76**, 144402 (2007)
- [4] O. Mathon, P. van der Linden, T. Neisius, M. Sikora, J. M. Michalik, C. Ponchut, J. M. De Teresa and S. Pascarelli, *XAS and XMCD under high magnetic field and low temperature on the energy-dispersive beamline of the ESRF*, Journal of Synchrotron Radiation **14**, 409-15 (2007)
- [5] J. M. De Teresa, J. M. Michalik, J. Blasco, P. A. Algarabel, M. R. Ibarra, C. Kapusta and U. Zeitler, *Magnetization of the Re-based double perovskites: Noninteger saturation magnetization disclosed*, Applied Physics Letters **90**, 252514 (2007)
- [6] J. M. Michalik, J. M. De Teresa, J. Blasco, P. A. Algarabel, M. R. Ibarra, Cz. Kapusta and U. Zeitler, *Temperature dependence of magnetization under high fields in Re-based double perovskites*, Journal of Physics: Condensed Matter **19**, 506206 (2007)
- [7] M. Sikora, O. Mathon, P. van der Linden, J. M. Michalik, J. M. de Teresa, Cz. Kapusta and S. Pascarelli, *Investigation of the field-induced magnetostructural transition in Ca₂FeReO₆ double perovskite by XMCD measurements up to 30 T*, Physical Review B **79**, 220402(R) (2009)
- [8] J. M. Michalik, J. M. De Teresa, J. Blasco, C. Ritter, M. R. Ibarra and Cz. Kapusta, *La, Nd and Sm substitution of Sr in Sr₂CrReO₆: the possibility of the electron doping*, Solid State Sciences **12**, 1121-1130 (2010)
- [9] J. M. Michalik, S. Roddaro, L. Casado, M. R. Ibarra and J. M. De Teresa, *Quantification and minimization of disorder caused by FEBID deposition on graphene*, Microelectronic Engineering **88**, 8, 2063-2065 (2011)
- [10] M. Romera, M. Munoz, M. Maicas, J.M. Michalik, J.M. de Teresa, C. Magen and J. L. Prieto, *Enhanced exchange and reduced magnetization of Gd in an Fe/Gd/Fe trilayer*, Physical Review B **84**, 9, 094456 (2011)
- [11] J. Fan, J.M. Michalik, L. Casado, S. Roddaro, M.R. Ibarra and J.M. De Teresa, *Investigation of the influence on graphene by using electron-beam and photo-lithography*, Solid State Communications **151**, 21, 1574-1578 (2011)
- [12] D. C. Leitao, J. Ventura, J. M. Teixeira, C. T. Sousa, S. Pinto, J. B. Sousa, J. M. Michalik, J. M. De Teresa, M. Vazquez, J. P. Araujo, *Correlations among magnetic, electrical and magneto-transport properties of NiFe nanohole arrays*, Journal of Physics Condensed Matter. **25**, 66007-9 (2013)
- [13] Soraya Sangiao, Jan M. Michalik, Laura Casado, María C. Martínez-Velarte, Luis Morellón, Manuel R. Ibarra, José M. De Teresa, *Conductance steps in electromigrated Bi nanoconstrictions*, Physical Chemistry Chemical Physics **15**, 5132 (2013)
- [14] Amalio Fernández-Pacheco, Luis Serrano-Ramón, Jan M. Michalik, M. Ricardo Ibarra, José M. De Teresa, Liam O'Brien, Dorothée Petit, Jihyun Lee, Russell P. Cowburn, *Three dimensional magnetic nanowires grown by focused electron-beam induced deposition*, Scientific Reports **3**, 1492 (2013)
- [15] J.M. De Teresa, P. Holujc, R. Córdoba, R. Fernández-Pacheco, J.M. Michalik, *Fabrication of cobalt trifluoride (CoF₃) phase from metallic cobalt by XeF₂-assisted Focused Electron Beam Induced Processing*, Microelectronic Engineering **125**, 78-82 (2014)

- [16] G. Tosolini, J. M. Michalik, R. Córdoba, J. M. de Teresa, F. Pérez-Murano, J. Bausells *Magnetic properties of cobalt microwires measured by piezoresistive cantilever magnetometry*, Nanofabrication 1, 80-85 (2014)
- [17] I. Serrano-Esparza, Jiyu Fan, J. M. Michalik, L. A. Rodríguez, M. R. Ibarra and J. M. De Teresa, *The nature of graphene-metal bonding probed by Raman spectroscopy: the special case of cobalt*, Journal of Physics D: Applied Physics 49 105301 (2016)

I am also the author of one book:

- J. M. Michalik, *Structural, magnetic and electronic properties of Re-based double perovskites*, Prensas Universitarias de Zaragoza, 2009, ISBN 978-84-92774-06-7

CONTRIBUTIONS TO CONFERENCES:

Oral contributions:

(I do not include oral contributions given by co-workers):

TITLE: "Tungsten micro- and nanostructures fabricated with Focused-Beam-Induced-Processing techniques"

CONFERENCE: XVII KKN - Conference on: "Superconductivity and other emergent states in systems with strongly correlated electrons"

PLACE: Karpacz (Poland)

DATE: 25-30. 10. 2015

TITLE: "High resolution maskless and resistless nanolithography of graphene monolayers"

CONFERENCE: 7th Polish Conference on Nanotechnology

PLACE: Poznan (Poland)

DATE: 24-27. 06. 2015

TITLE: "Spin transport in graphene based devices with magnetic Co electrodes"

CONFERENCE: Graphene Nanoscience: from Dirac Physics to Applications

PLACE: Granada (Spain)

DATE: 09-13. 09. 2012

TITLE: "Combined Focused Electron Beam Deposition and Electron Beam Lithography Processing of Graphene Based Devices for Spin Transport Measurements"

CONFERENCE: 4th Focused Electron Beam Induced Processing Workshop

PLACE: Zaragoza (Spain)

DATE: 20-21. 06. 2012

TITLE: "Fabrication of graphene based nanodevices"

CONFERENCE: TRAIN2 Nanofabrication Workshop

PLACE: Barcelona (Spain)

DATE: 08-09. 11. 2011

TITLE: "Quantification and minimization of disorder caused by FEBID deposition on graphene"

CONFERENCE: 4th Spanish Workshop on Nanolithography

PLACE: Oviedo (Spain)

DATE: 10-12. 11. 2010

TITLE: "X-MCD in the Cr-Re and Fe-Re based double perovskite at high pulsed magnetic fields"

CONFERENCE: 9th International School and Symposium on Synchrotron Radiation in Natural Science

PLACE: Ameliówka (Poland)

DATE: 15-20. 06. 2008

Posters:

(I do not include posters presented by co-workers):

TITLE: "Magnetic, electrical and magneto-transport thin nanohole arrays grown on flat anodic aluminum oxide templates"

CONFERENCE: ImagineNANO 2013

PLACE: Bilbao (Spain)

DATE: 23-16. 04. 2013

TITLE: "Magnetic properties of cobalt microwires measured by piezoresistive cantilever magnetometry"

CONFERENCE: Nanolito 2012: Fifth Spanish workshop on Nanolithography

PLACE: Donostia - San Sebastián (Spain)

DATE: 13-15. 11. 2012

TITLE: "Charge transfer in graphene flakes covered with metals probed by Raman spectroscopy"

CONFERENCE: Graphene Nanoscience: from Dirac Physics to Applications

PLACE: Granada (Spain)

DATE: 09-13. 09. 2012

TITLE: "Combined Focused-Electron-Beam-Induced-Deposition and Electron Beam Lithography for spin transport measurements in Graphene."

CONFERENCE: ImagineNANO 2011 / Graphene 2011

PLACE: Bilbao (Spain)

DATE: 11-14. 04. 2011

TITLE: "Quantification and minimization of disorder caused by FEBID deposition on graphene"

CONFERENCE: 36th International Conference on Micro and Nano Engineering

PLACE: Genoa (Italy)

DATE: 19-22 09. 2010

TITLE: "High pulsed magnetic field x-ray magnetic dichroism in CrRe-based double perovskite"

CONFERENCE: 7th National Synchrotron Radiation Conference

PLACE: Poznań (Poland)

DATE: 24-26. 09. 2007

PARTICIPATION IN RESEARCH PROJECTS:

2015 – present: 2014/14/E/ST3/00026 „*Sprzężenia i anizotropia magnetyczna wieloskładnikowych nanokompozytów i ferrofluidów badane technikami wysokorozdzielczej spektroskopii rentgenowskiej*”

2011 – 2013: INNPACTO IPT-010000-2010-002 “*Desarrollo y puesta en mercado de biosensores inmunomagnéticos con cuantificación mono y multiple analito (BIM)*”.

2009 – 2011: PI046/09, “*Nanotecnología basada en dispositivos híbridos grafeno-materiales magnéticos/superconductores*” founded by Gobierno de Aragón (D.G.A.)

2006 – 2008: EC-6FP STREP-027827, “*MUNDIS: Competitive Contact-less Position Sensor Based on Magnetoresistive Nanocontacts*”.

2005 – 2006: HPRN-CT-2002-00293 „*Spin, Charge and Orbital Ordering in complex Transition Metal Oxides: an integrated synthesis and measurement approach – SCOOTMO*” founded within the founded within the 5th Framework Programme of the European Commission „*Improving the Human Potential and the Socio-Economic Knowledge Base*”.

PARTICIPATION IN WORKSHOPS:

- 09. 2013: NanoValid Training Workshop on Advanced Characterization of Nanomaterials; Talk: "Electron Beam Lithography and Focused Electron/Ion Beam Induced Processing for micro and nano fabrication using Dual Beam equipments", Zaragoza (Spain)
- 06. 2013: 1st LMA Users Meeting; Talk: "Fabrication of nanodevices using the Dual Beam", Zaragoza (Spain)
- 10. 2011: TRAIN2 Workshop; Talk: "Fabrication by Electron Beam Litography of graphene-based devices and contacts on metallic nanowires"; Zaragoza (Spain)
- 10. 2010: 1st Spain - Hong Kong Bilateral Workshop on Micro and Nanosystems; Presentation of the poster: "Quantification and minimization of disorder caused by FEBID deposition on graphene", Zaragoza (Spain)
- 07. 2009: "Graphene", Benasque (Spain)
- 11. 2006: "X-ray Absorption Spectroscopy applications for the determination of the local atomic and electronic structure of solids", Warsaw (Poland)
- 09. 2005: European School on Magnetism: "New Experimental Approaches in Magnetism"; Presentation of the poster: "Investigation of the properties of electron doped $\text{Sr}_2\text{CrReO}_6$ "; Constanta (Romania)

EXPERIMENTAL EXPERIENCE AND SKILLS:

Experiments performed in large European facilities:

In the period from 2005 until 2009:

1 experiment performed in the High Pulsed Laboratory of the IFW Laboratory, Dresden (Germany), 1 experiment carried out in the High Magnetic Field Laboratory, Nijmegen (Netherlands), 2 experiments carried out in European Synchrotron Radiation Facility (BM29 and ID24 beamlines), Grenoble (France), 1 experiment performed in HASYLAB, DESY, Hamburg (Germany).

Nano-fabrication techniques:

Electron Beam Lithography for lift-off and etching processes, Electron Beam Induced Deposition, Ion Beam Induced Deposition, Oxygen Plasma Etching, Ion Beam Induced Milling, Electron Beam Induced Gas Assisted Etching.

Characterization techniques:

Electrical Transport (PPMS, in-house build equipment, in-situ Dual Beam Nanolab type equipment), Magneto Transport (PPMS, in-house build equipment), Hall-type measurements, High Field Magnetometry (see above), Low Field Magnetometry (SQUID, PPMS), Micro Raman Spectroscopy, Scanning Electron Microscopy with Energy Dispersion Spectroscopy, R-Ray Fluorescence.

Programming:

Lab View based experiment control and data collection software development

Data treatment and other software:

Origin, Kaleida, ELPHY32 (Electron Beam Lithography design software), CleWin (UV Lithography mask design software), Blender (3D images), CorelDRAW Suite (graphics), Adobe Photoshop (graphics), Viper, Athena, Atoms, IFEFFfit, Digital Micrograph

OTHER:

Languages: I speak fluently Polish, English and Spanish.

Academic activities:

Since 2014:

- Tutorial Classes of the Basics of Physics 1st and 2nd semester;
- Experimental sessions related to the Solid State Physics for 5th semester students;
- Experimental sessions related to Modern Nanofabrication Methods for MSc. Students.

In the academic years 2006-2007, 2007-2008 and 2008-2009 I was responsible for the Laboratory Experimental Sessions related to the Solid State Physics for the last course MSc. students. Also, I was taking part in the Tutorial Classes of the Basics of Physics for the first course students.

November 2009: Participation as a monitor in the "Open doors days" (visits of the secondary schools students to the Faculty of Science, University of Zaragoza) during the "Week of the science"