OF EXCELLENCE IN INTERNATIONAL MEETINGS

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2nd International Conference on

MAGNETISM AND MAGNETIC MATERIALS

September 24-26, 2018 | Budapest, Hungary

DAY 1

Keynote Forum

Georgios K Kertsopoulos, Mater Sci Nanotechnol 2018, Volume 2

Georgios K Kertsopoulos
Independent Private Inventor, Greece

Biography

Georgios K Kertsopoulos is a Greek-Canadian inventor, author, Researcher. He is the inventor of this world patented invention magnetic system of three interactions WO2013136097A4. He published his space-time theory in Greek in 2009. His research and experimentation over the years has led him to areas of physics, mathematics, electromagnetism, space-time experimentation, gravity-inertia measuring apparatus inventions, etc. He has published book in English, "Magnetic system of multiple interactions 3+3 And 5+5 =16 interactions in total vs. the known two from 0 distance to infinity and much more than that...,".

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MAGNETIC SYSTEM OF MULTIPLE INTERACTIONS 3+3 AND 5+5=16 INTERACTIONS IN TOTAL VS. THE KNOWN TWO FROM 0 DISTANCE TO INFINITY AND MUCH MORE THAN THAT...

The magnetic system of multiple interactions is an invention that introduces new multiple interactions and new types of magnetic fields, occurring between opposite interacting magnetic bodies, as these have never been observed before in the past by the magnetic scientific and experimental academic and laboratory experts. The world patent that supports and verifies the novelty of all ten claims of the invention is WO2013136097A4 bearing the title: "Magnetic system of three interactions". Furthermore, the invention has been granted a European Patent, granted patents also in U.S.A., Canada, Australia, U.K. Ireland, France, Switzerland, Germany, Greece, India, etc. The technology comprises a magnetic system performing three or five interactions (8X2=16). As an application, the magnetic system produces magnetic phenomena and interactions, such as the production of three or in other cases five different interactions and also their related three or five opposites, depending on the distance existing between the confronted magnetic constructions bearing the technology of the invention. These multiple interactions occur for the first time in the state of the art between confronted magnetic constructions, where there, only one interaction has been observed up to now. The polarity of like or unlike poles is determined according to the distance with the application of the invention's technology, whereas the polarity of like or unlike in the state of the art is independent of the distance. The magnetic system is a fully systemized product that can be used as an experimental instrument by everyone interested, to exploit the newly developed designing/constructing possibilities in the magnetic/electromagnetic products. All magnetic and electromagnetic products of the state of the art have been built based on the know-how of one interaction occurring between two confronted magnetic bodies, of either attractive or repulsive interaction. Now, the interactions can be numerous totaling more than 48.

Note:

Shailender Gaur, Mater Sci Nanotechnol 2018, Volume 2

Shailender Gaur
P.W.D. B&R, Br. Hisar, Government of Haryana, India

Biography

Shailender Gaur, Engineer by profession, national badminton player by passion & researcher by hobby, is posted as Sub Divisional Engineer (Mechanical), Mechanical Sub Division, Branch Hisar in P.W.D. B&R, Government of Haryana, India. He hosts engineering back ground from Karnataka State Open University along with research period of 18 years (16 various products prototypes under development in collaboration with Indian industries), self propelled volunteered efforts in renewable energy and within the department P.W.D. both branches, Building & Roads and Public Health Engineering (responsible for drinking water supply & sanitation). Working as mentor, training assessment at various sites for hand on practical experience for students & young professionals (500 so far), industrial product development in collaboration are few volunteered assignments completed by him. Tomorrow can be shaped if we plan today for young blood.

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ENHANCING MAGNETISM POWER; USE OF NANO TECHNOLOGY AND RENEWABLE POWER RESOURCES AS FUTURE ASPECTS

Life in whole solar system is found on earth only and every plant is revolving around its fix position and axis. Earth, we live on the plant its self is a magnetic globe and life here is in accordance with certain universal laws of nature and gravity, few known and few still to be discovered. Earth's magnetic behavior causes the life. It is classified to every possible extend that everything is made of atoms, bounded to each other by means of magnetically polarized force. Every possible electrical circuit can't work without proper earthing system, causing flow of electrons or any charged particles. Everywhere we depend upon magnetism. Insertion of Nano Technology in present time, have helped us to improve technological application in our day today life. The latest, undergoing application for removing scaling and undesired salts from water, make it use full for purposes of irrigation and drinking. The same application is use full for medical treatment of cancer; removing or killing cancer cells using nano technology. In this process the nano particles, electro magnetically powered, converting magnetic energy into heat energy, as radio waves (electro magnetic waves, kills cancer cells without affecting the rest of unmarked area. These two different applications are highly effective, previous one using solar radiant energy and later one traditionally powered, holding major stake of magnetism effect. Use of magnetic energy can improve efficiency for many applications of renewable power generation technology. If taken and considered for proper use of magnetic material, history can be changed and millions of people and places, having worst water conditions, can have a good life, good food and self sustained life. Mankind is to be saves for next generations to come and technology can help in that.

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DAY 2

Keynote Forum

Wolfgang Kleemann, Mater Sci Nanotechnol 2018, Volume 2

Wolfgang Kleemann
University Duisburg-Essen, Germany

Biography

Wolfgang Kleemann has completed his PhD at Goettingen University, Germany. After postdoc research at Université Paris-Sud, Orsay, and University of California, Santa Barbara, he became full Professor of University Duisburg-Essen, Germany, in 1982. His actual main research fields are magnetism, ferroelectricity, multiferroics and magnetoelectrics. His more than 450 publications have achieved over 12,000 citations at h-index 47. He has been serving in editorial boards of reputed journals and organization committees of various conference series.

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Note:

MULTIFERROIC AND MAGNETOELECTRIC NANOCOMPOSITES FOR DATA PROCESSING

Switching of magnetism with electric fields and magnetic control of electric polarization are challenging tasks for multiferroic and magneto-electric materials. For data processing applications various composite realizations appear most promising: We propose 2-2 nanocomposites based on magneto-electric (ME) chromia (111) films (Cr_2O_3), which allow electric switching of the magnetization of epitaxially grown ultrathin ferromagnetic Co/Pt/Co trilayers via inter-facial exchange bias. Random access memory (ME-RAM) and logic cell MEXOR have been approved. Regular composites of magnetostrictive cobalt ferrite ($CoFe_2O_4$) nanopillars are PLD-grown in a piezoelectric film of barium titanate ($BaTiO_3$). In a transverse magnetic field, they exert a staggered shear stress-induced surface pola¬ri-za¬tion pattern in the BaTiO3 environment. Possible data storage applications will be discussed. Ceramic 0-3 composites of antiferromagnetic-ferroelectric Bi $(Fe,Co)O_3$ nanoclusters embedded in $K0.5Bi0.5TiO_3$ reveal giant linear magneto-electric response via bilinear piezo-magneto-electric coupling, M=αE with α»10-5 s/m. They are candidates for future electrically addressable nanodot mass memory devices.

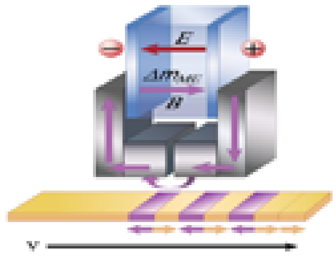

Fig.1: Magnetoelectric (ME) write head for magnetic hard disk. An electric field E gene-rates magnetic moment ΔmME in a ME material, thus giving rise to magnetic flux density B. A gap in the flux closing yoke emits a stray field, which writes a magnetic bit into the moving hard disk.

Recent Publications

1. Kleemann W (2009). Switching magnetism with electric fields. Physics 2: 105-6.
2. Borisov B et al. (2006). Magnetoelectric Switching of Exchange Bias. Phys. Rev. Lett. 94:117293.
3. Schmitz-Antoniak C et al. (2013). Electric polarization in nano-composites tuned by magnetic field. Nature Commun. 4:2051.
4. Henrichs LF et al. (2016). Multiferroic clusters. Advan. Funct. Mater. 26: 2111-2121.

Sandeep Kumar Srivastava, Mater Sci Nanotechnol 2018, Volume 2

Sandeep Kumar Srivastava

Central Institute of Technology, India

Biography

S K Srivastava is working as an Associate Professor and Head at Department of Physics, CIT Kokrajhar India. Moreover, he is serving the institute as Dean (R&D). He is recipient of Early Carrier Research Award 2017; given by Ministry of Science and Technology (DST-SERB), Government of India. He is principle investigator of two projects. He has a strong interest to work in material science with a special emphasis to magnetic materials for wide range of applications. He has published more than 50 papers and has delivered several invited talks in India and abroad.

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BIT PATTERNED MEDIA- PROBING MAGNETIC PROPERTY USING EHE MEASUREMENT

There is a frantic race to increase the storage density of hard disk drive (HDD) due to its huge applications. The recording media used for making conventional HDD is made up of multilayers thin film or magnetic alloys, which naturally forms nanometer-scale grains and each recorded bit is stored across hundreds of these magnetic grains. Although, the conventional perpendicular media is being used in current recording technology, but it is expected to lose its fuel in next few years due to a phenomenon called super-paramagnetism (thermal stability of recorded bit). Recently, one alternative potential way has been proposed, so called bit patterned media (BPM). In such bit patterned media, each artificially fabricated magnetic nanostructure can store an individual bit rather than using hundreds of naturally formed small grains to store single bit. Ordered arrays of isolated magnetic nanostructures are of considerable interest to increase the storage density of hard disks beyond the current perpendicular media. In such bit patterned media (BPM), each artificially fabricated magnetic nanostructure can store an individual bit. We developed a novel non-lithographic method to fabricate perpendicularly magnetized BPM system and we studied Co/Pt bit pattern media. In present talk, the author will discuss few results on Co/Pt bit pattern media, as well as results on CoTb alloys-based bit patterned media. These materials were fabricated using the barrier layer of auto-assembled anodic alumina template (a non-lithographic method) and by depositing either CoPt multilayers or CoTb alloy to form an ordered array of ferromagnetic nanodots, so-called nanobumps. We used extraordinary hall resistance measurements to probe magnetization reversal mechanism and switching field distribution. The role of interdot exchange coupling and dipolar coupling, magnetization reversal process will be discussed.

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DAY 3

Keynote Forum

Marie-Bernadette Lepetit, Mater Sci Nanotechnol 2018, Volume 2

Marie-Bernadette Lepetit

Institut Laue Langevin, France

Biography

Marie-Bernadette Lepetit has completed her PhD at the Université Paul Sabatier in Toulouse France on the ab-initio treatment of the electronic correlation. She has obtained a research position in the Laboratoire the Physique Quantique, CNRS in 1988 where she stayed until 2004. In 2004, she moved to the CRISMAT in Caen as a CNRS Director of research where she initiated a theory group. In 2012, she then moved to Grenoble where she joined the Institut Néel and Institut Laue Langevin where she headed the theory group until recently. From 2008 to 2015, she headed the French National Research Group (GdR) on strongly correlated materials gathering more than 450 researchers. Recently she is heading the committee program for high performance computing in chemistry and is member of the French National Committee for Scientific Research (electronic structure in condensed matter section). She is a Theoretician, specialist of the ab-initio treatment of electronic and magnetic excitation in strongly correlated materials. She works at the interface of solid state physics and quantum chemistry and aims at solving the structure-properties relationships in strongly correlated systems.

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THE ROLE OF THE RARE-EARTH ON THE MANETO-ELECTRIC COUPLING: THE RMN2O5 FAMILY

Magneto-electric, multiferroic material have attracted a lot of attention in the last decade due to their ability to control their polarization or dielectric constant using a magnetic field, or to control their magnetic order using an electric field. Among these materials the RMn2O5 family is a prototypal system as in some of its members the coupling between the electric and magnetic properties is among the largest, as was first shown by Hur et al. In the RMn2O5 family the magneto-electric coupling originates in the release of the magnetic frustration between the manganese ions. However, according to the nature of the rare-earth, the coupling can either be large as in the Tb compoud or nill as in the Sm one. Similarly, the polarization can take quite different values. For instance, the GdMn2O5 compound exhibits an extremely large polarization of about 3600μC/m2. In this talk we will try to present a comprehensive model explaining the role of the rare earth both on the existence of a magneto-electric coupling and the magnetic order, as well as on the polarization amplitude.

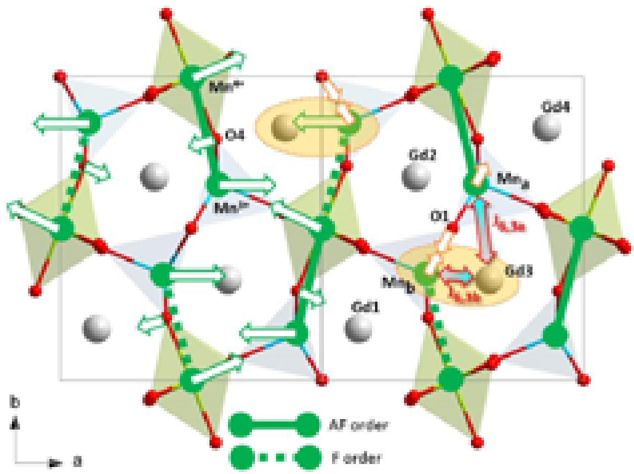

Figure.1: Atomic displacements associated with the release the magnetic frustration at the origin of the polarization.

Recent Publications

1. G Yahia, F Damay, S Chattopadhyay, V Balédent, W Peng, E Elkaim, M

Whitaker, M Greenblatt (2017). Recognition of exchange striction as the origin of magnetoelectric coupling in multiferroics. Phys. Rev B95: 184112.

2. G Yahia, F Damay, S Chattopadhyay, V Balédent, W Peng, S W Kim, M Greenblatt, M B Lepetit and P Foury-Leylekian (2018). Experimental evidence for the microscopic mechanism of the unusual spin-induced electric polarization in GdMn2O5. Phys. Rev B 97: 085128.

3. W Peng, V Balédent, S Chattopadhyay, MB Lepetit, G Yahia, C Colin, M J Gooch, C R Pasquier, P Auban-Senzier, M Greenblatt, P Foury-Leylekian (2017). Toward pressure induced multiferrocity in PrMn2O5. Phys. Rev. B 96, 054418.

4. V Balédent, S Chattopadhyay, P Fertey, M B Lepetit, M Greenblatt, B Wanklyn, F O Saouma, J I Jang et P Foury-Leylekian (2015). Evidence for room temperature electric polarization in RMn2O5 multiferroics. Phys. Rev. Letters 114, 117601.

5. Marie-Bernadette Lepetit (2016). How to compute the magneto-electric tensor from ab-initio calculations. Theor. Chem. Acc 1: 135.

Note: