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Chapter 1 : Biomagnetism and Magnetic Biosystems Based on Molecular Recognition Processes - CORE

Biomagnetism and magnetic biosystems based on molecular recognition processes: Sant Feliu de Guixols, Spain, September

Giant Magnetoresistance in Granular Systems: Samuel Jiang, and C. B 46, Arrays of Magnetic Nanowires: We have pioneered arrays of magnetic nanowires, which may be single-material or multi-segmented, suitable for a wide variety of magnetic, chemical, biomedical, and MEMS applications, and indeed the focused research area of more than ten research centers worldwide. B 51, B 58 Rapid Communications , B 61 Rapid Commun. Physics of Exchange Bias: Exchange bias occurring across the interface between a ferromagnet and an antiferromagnet is an intriguing phenomenon of scientific and technological importance. We have uncovered some of the rich physics of exchange bias, including the memory effect, exchange bias in the paramagnetic state, spiraling spin structure, and oscillatory exchange bias. Shull, Kai Liu, S. B 73, Andreev reflection spectroscopy ARS utilizes the conversion of a supercurrent into a normal current. We have developed ARS into a quantitative technique for measuring the spin polarization of a metal as well as the superconducting gap of a superconductor. B 63, B 81, Bi is a semimetal with unusual Fermi surfaces and electrons and holes of low effective mass and carrier density. Yang, Kai Liu, C. B 61, CrO2 and Other Half-Metals: In a half-metal with only one spin band at the Fermi energy, the electrons are fully polarized and thus the ultimate material for spintronics. We have measured and identified CrO2 as a true half-metal as well as several others with exceptionally high spin polarization. B 66, In the spin-transfer torque STT effect the spin angular momentum carried by a spin-polarized current can exert a torque to switch nanomagnet, induce spin precession and generate microwave radiation, all accomplished without using an external magnetic field. We have made the first observation of STT effect in a single ferromagnetic layer and in granular solid. Magnetic Nanorings and Tunnel Junctions: We have pioneered a new method for fabricating nanorings with the largest number , the smallest ring nm and narrowest ring width 20 nm. We also made the first demonstration of nanoring tunnel junctions, exploiting the new memory states and switching characteristics unattainable in disk tunnel junctions. Manipulation of Nanowires in Suspension by Electric Tweezers: Manipulation of nanoentities in suspension is in the realm of extremely low Reynolds numbers where viscous force overwhelms. We have developed the technique of electric tweezers using electrical voltages to manipulate nanowires with precision better than nm. Electric tweezers is a new technique for a wide range of biomedical, MEMS, and fluid mechanics applications. Materials with Perpendicular Magnetic Anisotropy: In , a new family of Fe superconductors have been discovered, with characteristics very different from those the conventional s-wave and the cuprate d-wave superconductors. We are among the first group that have demonstrated that the gap of the new Fe superconductors have the s-wave symmetry. In spintronics, both elect charge and spin are manipulated. On the heal of spintronics, we now have spin caloritronics where one exploits the interaction between heat transport and the charge or spin degree of freedom. Spin Seebeck effect and spin-dependent spin transport are two very recent examples. Spintronic devices have evolved from first-generation 1G field devices, driven by magnetic field to second-generation 2G current devices driven by the spin transfer torque STT effect. Very recently, voltage-controlled spintronic devices have been achieved where low voltages less than 1.

Chapter 2 : - NLM Catalog Result

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In modern biosensors, particularly in microfluidic-based platforms, the incorporation of micronand nano-scale carriers has a wide range of applications and benefits to address specific platform.

Chapter 4 : The Scanning TMR Microscope for Biosensor Applications

Biomagnetism and Magnetic Biosystems Based on Molecular Recognition Processes; Adrian Ionescu, University of Cambridge, Cavendish Laboratory.

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based on molecular recognition processes. biomagnetism and magnetic biosystems based on molecular recognition processes all papers have been peer reviewed.

Chapter 8 : Dr Adrian Ionescu

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