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Are ferroelectric tunnel junctions a reliable non-volatile memory? The results show high potentialtowards multi-level and reliable non-volatile memories. The authors report ferroelectric tunnel junctions based on samarium-substituted layered bismuth oxide,which show tunnelling electroresistance of 7???x???105 and high endurance over 5 billion cycles,even when the film is down to one nanometer.

Is tunnelling electroresistance over 109 a reliable nonvolatile memory? Furthermore,tunnelling electroresistance over 109 is achieved in ferroelectric tunnel junctions with 4.6-nanometer samarium-substituted bismuth oxide layer,which is higher than commercial flash memories. The results show high potentialtowards multi-level and reliable non-volatile memories.

Who are the authors of giant tunneling electroresistance in two-dimensional ferroelectric tunnel junctions? Lili Kang,Peng Jiang,Hua Hao,Yanhong Zhou,Xiaohong Zheng,Lei Zhang,Zhi Zeng. Giant tunneling electroresistance in two-dimensional ferroelectric tunnel junctions with out-of-plane ferroelectric polarization.

Can ferroelectric tunnel junctions maintain high electroresistance? Ferroelectric tunnel junctions are promising towards high-reliability and low-power non-volatile memories and computing devices. Yet it is challengingto maintain a high tunnelling electroresistance when the ferroelectric layer is thinned down towards atomic scale because of the ferroelectric structural instability and large depolarization field.

Are ferroelectric tunnel junctions based on perovskite-oxide barrier layers? So far,most existing FTJs have been based on perovskite-oxide barrier layers. The recent discovery of the two-dimensional (2D) van der Waals ferroelectric materials opens a new route to realize tunnel junctions with new functionalities and nm-scale dimensions.

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Why are two-dimensional ferroelectric materials a new route to nm-scale tunnel junctions? The recent discovery of the two-dimensional (2D) van der Waals ferroelectric materials opens a new route to realize tunnel junctions with new functionalities and nm-scale dimensions. Because of the weak coupling between the atomic layersin these materials,the relative dipole alignment between them can be controlled by applied voltage.

3University of Tennessee, Knoxville, Knoxville, TN, United States of America E-mail: incorvia@utexas Received 19 November 2023, revised 30 January 2024 Accepted for publication 5 April 2024 Published 23 April 2024 Abstract Perpendicular magnetic tunnel junction (pMTJ)-based true-random number generators (RNGs)

Ferroelectric tunnel junctions (FTJ) are promising for future lower power memory and neuromorphic computing applications. 1 The resistive switching of the FTJs is based on the abrupt change of current when the spontaneous polarization direction in ferroelectric (FE) material changes under external electric field. The carrier transport is dominated by quantum ???

twisted TMD tunnel junction, where the tunnel barrier has been omitted for clarity. When the spin-valley locking is the same in both layers, transport accros the junction leads to a low resistance state, R low. In contrast, rotating one of the layers by 60 (i.e. Cz 6 operation) leads to an effective swapping

TJ ??? tunnel junction, EBL ??? electron blocker layer, QW ??? quantum well II. DEVICE DETAILS The reference device is a blue light emitting laser diode featuring two InGaN single-quantum well active regions that are separated by an InGaN tunnel junction.7 A second tunnel junction is grown on top for uniform carrier injection. The full

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In-Plane Ferroelectric Tunnel Junction Huitao Shen,1,* Junwei Liu,2 Kai Chang,3 and Liang Fu1 1Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA 2Department of Physics, Hong Kong University of Science and Technology, Clear Water Bay, ries with a low energy consumption and high performance are


Due to semiconductor characteristics and non-volatile ferroelectricity, two-dimensional (2D) In 2 Se 3 are considered as potential candidates for next-generation storage and computing ???


The data are taken at room temperature. The arrows indicate the orientation of the CoFeB magnetization. Adapted from Lee Y M, Hayakawa J, Ikeda S, Matsukura F, Ohno H 2007 Effect of electrode composition on the tunnel magnetoresistance of pseudospin-valve magnetic tunnel junction with a MgO tunnel barrier. Appl. Phys. Lett. 90 (3), 212507.


1 ? Although T and P symmetries are individually absent in MnSe, due to static/dynamic C3v point symmetry and magnetic moments of Mn atoms, the combined PT symmetry is still ???


Perovskite/silicon tandem solar cells have strong potential for high efficiency and low cost photovoltaics. In monolithic (two-terminal) configurations, one key element is the interconnection region of the two subcells, which should be designed for optimal light management and prevention of parasitic p/n junctions. We investigated monolithic ???

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Furthermore, discrete charged impurities in the tunnel junction region signicantly inuence the tunneling rates in ?????layer tunnel junctions. Here we demonstrate that electrical dipoles, i.e. zero???

the quantum tunnel junction accompanied by light emission [1-3] . Different from the spontaneous emission in LEDs which is limite d by the recombination rate of electron-hole pairs, the generation of

As shown in figure 7(a), they demonstrated Au/PVDF/W tunnel junction and observed resistance switching behavior in the I???V curve (figure 7(b)). Figures 7(c) and (d) present phase images corresponding to varying PVDF thickness, while figures 7(e) and (f) depict hysteresis loops for amplitude based on PVDF thickness. This indicates that the

Tunnel Junctions, as addressed in this review, are conductive, optically transparent semiconductor layers used to join different semiconductor materials in order to increase overall device efficiency.

Superconducting tunnel junctions (STJs), being an efficient approach to investigating the quantum tunneling processes of quasiparticles in superconductors, can serve as an extraordinary platform for exploring novel electronic states and strong correlation phenomena of condensed matters [1????7].The technological appeal of STJs is the exceptional sensitivity, ???

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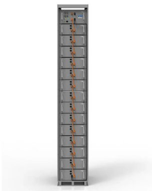
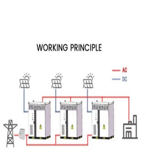


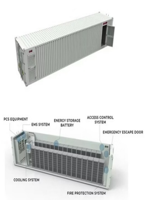
Keywords: tunnel junction; MOCVD; quantum well; co-doping; solar cells
1. Introduction Solar energy is a renewable and environmentally friendly source of energy. Efforts to generate greater electric power from solar energy have benefited from ???


Yoon, C. et al. Synaptic plasticity selectively activated by polarization-dependent energy-efficient ion migration in an ultrathin ferroelectric tunnel junction. Nano Lett . 17, 1949???1955 (2017).

(depolarization energy density+free energy density+gradient energy density). Furthermore, the impact of the bottom insulator layer on ferroelectric's gradient energy is also studied. INTRODUCTION A ferroelectric tunnel junction (FTJ) utilizes the mechanism of quantum tunneling to switch between bi-stable states 1 34. To explore the microscopic

Ferroelectric tunnel junctions (FTJs) have attracted attention as devices for advanced memory applications owing to their high operating speed, low operating energy, and excellent scalability. In particular, hafnia ferroelectric materials are very promising because of their high remanent polarization (below 10 nm) and high compatibility with complementary metal ???

Josephson tunnel junction arrays and Andreev weak links: linked by a single energy-phase relation A. Mert Bozkurt??? Kavli Institute of Nanoscience and QuTech, Delft University of Technology, P.O. Box 4056, 2600 GA Delft, The Netherlands Valla Fatemi?? School of Applied and Engineering Physics, Cornell University, Ithaca, NY, 14853, USA

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Tunnel junctions for multijunction solar cells are provided. According to an aspect of the invention, a tunnel junction includes a first layer including p-type AlGaAs, a second layer including n-type ???


quantum-mechanical tunneling limits ultimate scaling. On the otherhand,quantumeffectsserveas the fundamentaloperation mechanism for nanodevices such as tunneling FETs [1], [2], magnetic tunnel junction (MTJ) [3], [4], and ferroelec-tric tunnel junction (FTJ) [5], [6]. To capture the quan-tum effects in those device studies, the nonequilibrium



ARTICLE Quantum biological tunnel junction for electron transfer imaging in live cells Hongbao Xin1,2,3,4, Wen Jing Sim4, Bumseok Namgung 4, Yeonho Choi 5, Baojun Li 1 & Luke P. Lee 2,3,4,6,7,8

1 Experimental Observation of Single Skyrmion Signatures in a Magnetic Tunnel Junction N. E. Penthorn1, X. Hao2, Z. Wang2, Y. Huai2, and H. W. Jiang1* 1Department of Physics & Astronomy, University of California, Los Angeles, California 90095, USA 2Avalanche Technology, Fremont, California 95438, USA Abstract We have deterministically created a ???



Examples include vortex oscillators or spin-Hall nano-oscillator arrays used to demonstrate neuromorphic computing. 29???31 Vortex oscillators are composed of ferromagnetic metals that form a magnetic tunnel junction. 32 A voltage bias on the junction causes a magnetic vortex in one of the electrodes of the junction to oscillate generating an

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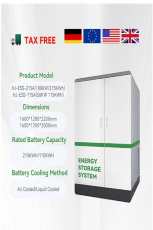

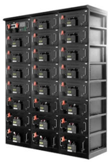

Lattice matched InAlGaAs tunnel junctions with a 1.18 eV bandgap have been grown for a triple-junction solar cell on InP. By including two InGaAs quantum wells in the structure, a peak tunnel current density of 113 A/cm2 was observed, 45 times greater than the baseline bulk InAlGaAs tunnel junction. The differential resistance of the quantum well device is 7.52 x 10???4 ?(C) cm2, a ???