

What is a ferroelectric field-effect transistor (FeFET)?

The ferroelectric field-effect transistor (FeFET) is one of the leading contenders to succeed charge-trap-based flash memory (CTF) devices in the current vertically-integrated NAND flash storage market.

Are ferroelectric field-effect transistors a key component in Data-Centric Computing?

This Perspective examines the use of ferroelectric field-effect transistor technologies in current embedded non-volatile memory applications and future in-memory, biomimetic and alternative computing models, arguing that the devices will be a key component in the development of data-centric computing.

Can ferroelectrics be used in field effect transistors?

npj 2D Materials and Applications 8, Article number: 29 (2024) Cite this article In this study, we applied ferroelectrics to the gate stack of Field Effect Transistors (FETs) with a 2D transition-metal dichalcogenide (TMDC) channel, actively researching for sub-2nm technology node implementation.

Why do field-effect transistors have a subthreshold swing?

The operating power of field-effect transistors is constrained in part by the minimum change in voltage needed to change the current output. This subthreshold swing (SS) limit is caused by hotter electrons from a thermal electron source leaking over the potential of the gate electrode.

Can ferroelectric field effect transistors be used in a fully depleted silicon-on-insulator (SOI) platform?

In 2017 IEEE Int. Electron Devices Meeting (IEDM) 19-7 (IEEE, 2017). This work demonstrated scaled ferroelectric field-effect transistors in the fully depleted silicon-on-insulator (SOI) platform at the 22 nm node. Trentzsch, M. et al. A 28 nm HKMG super low power embedded NVM technology based on ferroelectric FETs.

Is a ferroelectric field-effect transistor a synapse for deep neural network accelerators?

This work demonstrated multi-state (5-bit) weight cell/analogue synapse based on a ferroelectric field-effect transistor for deep neural network accelerator applications with a $\pm 25\%$ conductance modulation and ~ 75 ns program pulses. Seo, M. et al.

Beyond memories, coupling of ferroelectric polarization field with electronic or optoelectronic material in FeFETs brings numerous novel physical phenomena, including adaptive-learning capability, 15-20 negative ...

Field Effect Transistor For decades there has been research on transistors that can be deposited on surfaces and are very thin. These transistors are all so-called Field Effect Transistors (FETs) because this construction consists of thin films rather than the alternative, so-called bipolar transistors which require diffusion of "dopants" into a substrate.

Ferroelectric Field Effect Transistors-Based Content-Addressable Storage-Class Memory: A Study on the Impact of Device Variation and High-Temperature Compatibility ... Even though a typical CAM cell comprises two SRAM cells, ...

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This review examines the development and evolution of the ferroelectric layer in ferroelectric field-effect transistors (FeFETs) and ferroelectric random-access memory ...

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In the superlattice FE/DE/FE stack, the depolarization field (E_{dep}) stretches out the coercive field distribution of the domain. As the E_{dep} increases, the energy barrier needed to be overcome for polarization reversal to occur due to the increase of the switching field of the domain and switching time [12]. This effectively broadens the ...

Ferroelectric field-effect transistors (FeFETs) have been considered as promising electrically switchable nonvolatile data storage elements due to their fast switching speed, programmable conductance, and high ...

In this work, we have developed a large memory window (MW) ferroelectric field effect transistor (FeFET) memory for vertical NAND storage. We demonstrate that:

The performance of logic circuits encompasses the same trends as memories plus some additional considerations (see Fig. 3) field-effect transistors (FET) are in general faster than spintronic ...

Power electronics are becoming increasingly more important, as electrical energy constitutes 40% of the total primary energy usage in the USA and is expected to grow ...

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