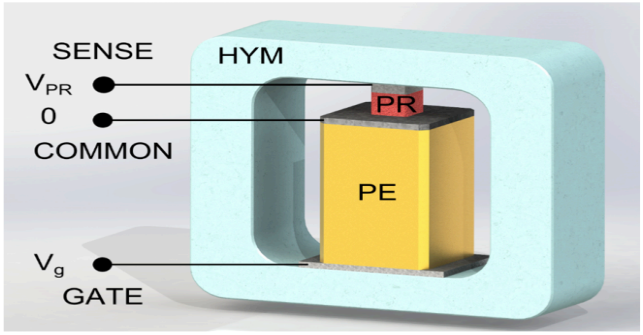
PETMEM : (PiezoElectronic Transduction MEMory device)

Computer clock speeds have not significantly increased since 2003, creating a challenge to invent a successor to CMOS technology able to resume the improvement in clock speed and power performance. The key requirements for a viable alternative are scalability to nanoscale dimensions – following Moore's Law – and simultaneous reduction of line voltage in order to limit switching power. Achieving these two aims for both transistors and memory allows clock speed to again increase with dimensional scaling, a result that would have great impact across the IT industry. PETMEM is a European partnership amongst Universities, Research Institutions, SMEs and a large company that will focus on the development of new materials and characterization tools to enable the fabrication of an entirely new low-voltage memory element. This element makes use of internal transduction in which a voltage state external to the device is converted to an internal acoustic signal that drives an insulator-metal transition.



The principle behind the piezoelectric transistor. A voltage driven piezoelectric element creates high stresses in a piezoresistive element changing its electrical resistance from an insulator to a conductor.

Modelling based on the properties of known materials at device dimensions on the 15nm scale predicts that this mechanism enables device operation at voltages an order of magnitude lower than CMOS technology (power is reduced two orders) while achieving 10GHz operating speed. Additional, possibly earlier development applications include ultralow power RF switches for telecommunications devices and low voltage several GHz logic devices especially for portable equipment.

The consortium that will develop PETMEM technologies comprises 11 partners: Bio Nano Consulting (London UK), IBM Research (Zurich, Switzerland), Max Planck Institute (Dresden and Halle, Germany), Solmates (Enschede, The Netherlands), SINTEF (Oslo, Norway), National Physical Laboratory (Teddington UK), University of Gent (Gent, Belgium), EMPA (Switzerland), Aixacct (Aachen Germany), Electrosciences (Surrey, UK) and DCA (Turku, Finland).

For more information contact the consortium at: www.petmem.eu

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