Novel ferroelectric NAND flash memory cell

Realization of more than 100 million program/erase cycles at less than 6 volts

We have demonstrated that the use of ferroelectric gate field-effect transistors (FeFETs) as memory cells dramatically improves the performance of NAND flash memory. The FeFET, the newly developed memory cell, can be programmed and erased as many times as 100 million or more with programming voltage of less than 6 V, whereas the conventional NAND flash memory cells have ten thousand program/erase endurance cycles with approximately 20 V programming voltage. Conventional NAND flash memories will face several fundamental problems at the 30-nm technology generation, whereas this novel memory cell will fit the next 20-nm and 10-nm generations. Thus, this memory cell is expected to be used in a next-generation, high-density, high-capacity nonvolatile memory.

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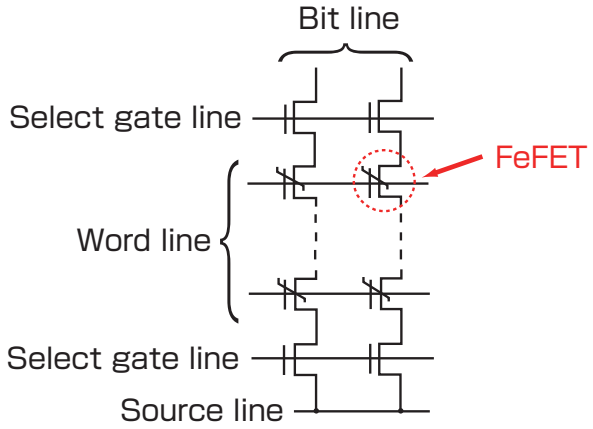

Array configuration of Fe-NAND flash memory

Observation of first acid dissociation at a H_2SO_4 aqueous solution surface

Towards clarification of the heterogeneous reactions on/in sulfate aerosols

Sulfate aerosols are known as key players in stratospheric ozone depletion. Although some field observations and laboratory work corroborate this general picture, a fundamental understanding of the surface structure and the information of the ionic compositions and first acid dissociation at the acid surface are still lacking. Sum frequency generation spectroscopy (SFG) is an excellent technique for characterizing molecules at a surface or buried interface. This research identified unequivocally the acid concentration of the first acid dissociation at the sulfuric acid solution surface, and the results suggest the existence of the net orientation of the hydrate network at the H_2SO_4 aqueous surface. Incorporating our results into atmospheric models will lead to a fuller and more accurate picture of the heterogeneous reactions on/in the sulfate aerosols.

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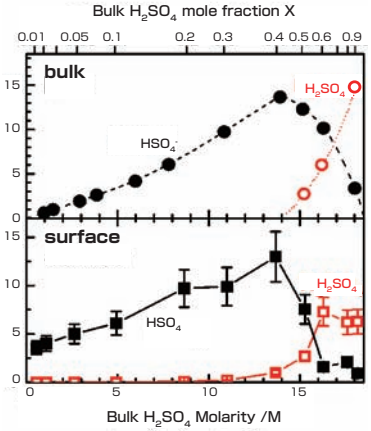

The bulk molarities of HSO_4^- (●) and H_2SO_4 (○) species from the Raman data as a function of acid concentration and the peak strengths (Aq) of the s-SO_3 (■) and s-SO_2 (□) peaks of the SFG of H_2O/H_2SO_4 solutions.