

# Non-volatile Device with Aluminum Oxide

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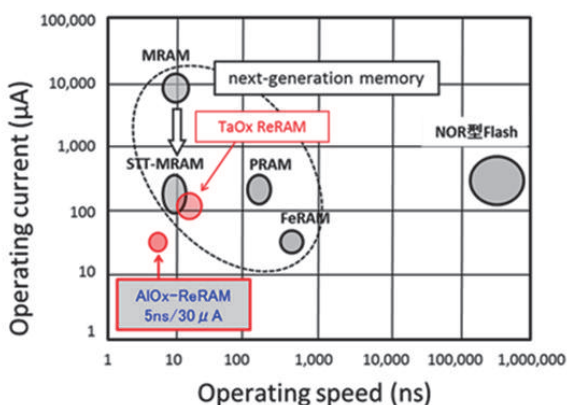
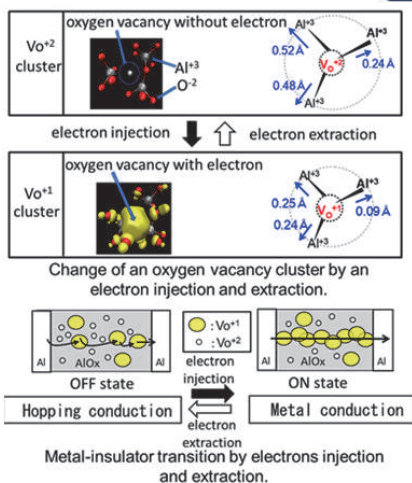
## Background

- With the development of IT society, the increase in power consumption of electronic equipment has become a big problem. Normally-off computing is advocated with this view. High performance non-volatile devices are desired in order to realize it.

## Aim

- A switching effect of aluminum oxide with oxygen defects induced by electric fields is applied to resistive random access memories (ReRAM) and non-volatile switching devices. This device has high resistance ratio, high-speed response and low consumption current. It does not include rare/toxic elements.

## Advanced Research Topics



Comparison of the performance of non-volatile memories.

The operating current and speed of AIOx ReRAM are lower and quicker than other non-volatile memories.

A cluster structure of amorphous aluminum oxide with an appropriate amount of oxygen vacancy (AIOx) changes by electrons injection or extraction, and it becomes a metastable ON or OFF state. It is expected that AIOx is practically infinite times rewritable, because the state change without chemical changes such as the oxidation-reduction reaction.

## Publications

- S. Kato et al., J. Phys. Conf. Series 38 (2006) 148-151.
- S. Kato et al., J. Phys. Conf. Series 109 (2008) 012017.

## Applied area and future prospects

- Applications for non-volatile memory.
- Applications for non-volatile switch.
- Challenge for multivalued logic device.
- Related patents are more than five.

## Issues for technology transfer

- With the present condition, yield ratio is low and stability of switching is poor. Issues for practical use are resolving them by improving the manufacturing methods.