

Innovative transistors based on magnetically induced movement of ions

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Background

- Expansion of demand for electrochemical devices in various application fields.
- Limitation in operation principle of conventional electrochemical devices.
- Expectations for breakthrough in electrochemical devices.

Aim

- Innovative transistors based on magnetically induced movement of ions.
- Observation of reversible variation in electromotive force.
- Exploring novel electrochemical devices operated by magnetic field.

Advanced Research Topics

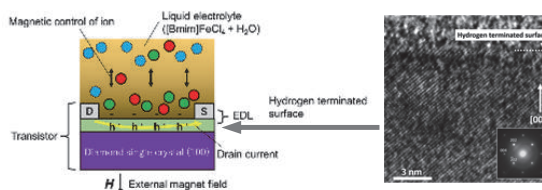
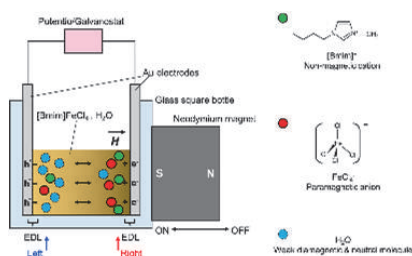
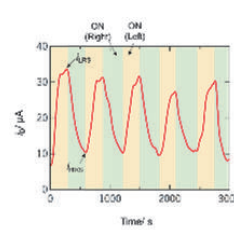
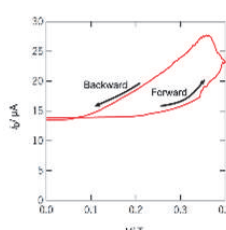
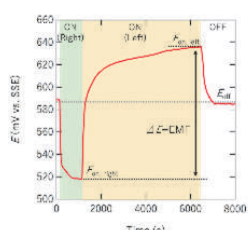
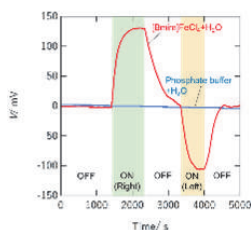


Illustration of two-terminal magneto-electrochemical cell (left) and components of liquid electrolyte (right).

An electric double layer transistor composed of diamond and magnetic electrolyte (left). Cross section TEM image of the hydrogen terminated surface (right).



Variation in electromotive force (EMF) of the cell in response to magnetic field switching (left). Variation in electrode potential with respect to Ag/AgCl (right).

Variation in drain current in response to magnetic field sweep (left), and one in response to magnetic field switching (right).

Publications

• Takashi Tsuchiya, Masataka Imura, Yasuo Koide, Kazuya Terabe. Magnetic Control of Magneto-Electrochemical Cell and Electric Double Layer Transistor. SCIENTIFIC REPORTS. 7 (2017) 10534-1-10534-9

Applied area and future prospects

- Low power consumption memories switched by a magnetic filed.
- Sensors and power generators using surface charge.
- Remote control of electrochemical devices.

Issues for technology transfer

- Enhancement of magnetically induced electromotive force.
- Improvement of response speed of ion transport.
- Development of solid magnetic electrolyte for various application.