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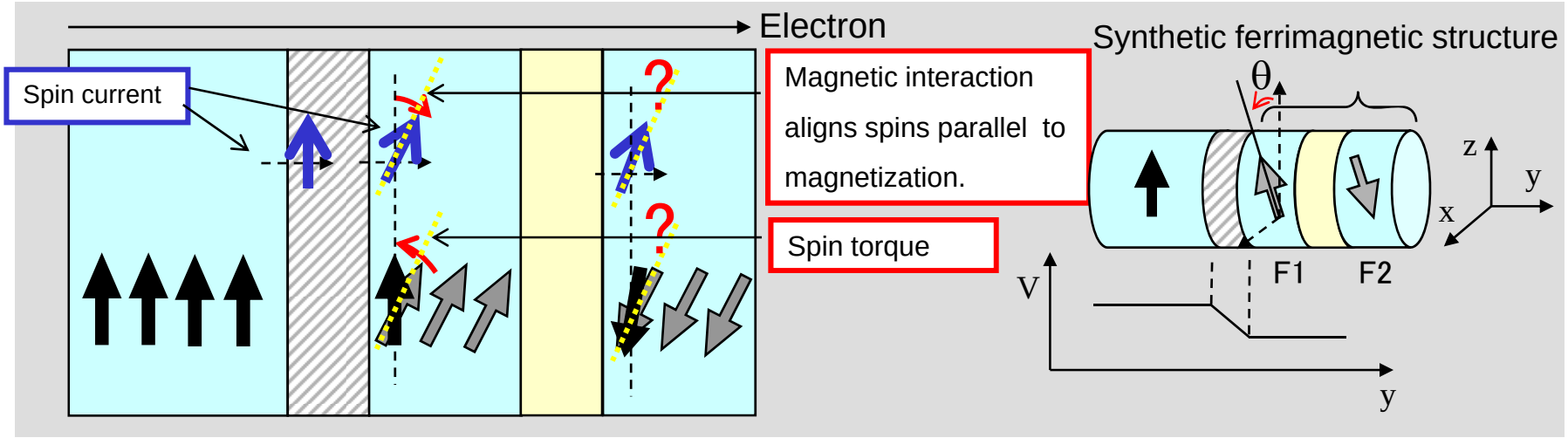
Simulation technology for spintronics devices

Successful prediction of magnetization reversal current of magnetic multilayer



Electronic spin is a micro base unit of the magnetic properties of materials. Hitachi, Ltd. and the Institute for Material Research, Tohoku University have developed a new simulation tool for spintronics devices that controls the magnetization directions by using the spin current. This tool first analyzes the spin current with a quantum mechanical method and obtains the “spin torque”, which causes magnetization reversal. Next, it simulates the dynamics of the magnetizations, taking into account the obtained spin torque. This tool makes it possible to predict the switching current at which the magnetization reversal occurs.

This simulation tool obtained a switching current for magnetic multi-layers consisting of ferromagnetic bi-layers that agrees well with experimental results. This tool is useful for elucidating the spin-dependent phenomena and for designing spin torque devices with magnetic multi-layers.

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*1 Ferromagnet : Substance which has magnetic property such as iron, cobalt, and nickel.