Ceramics for Symbiosis with Global Environment

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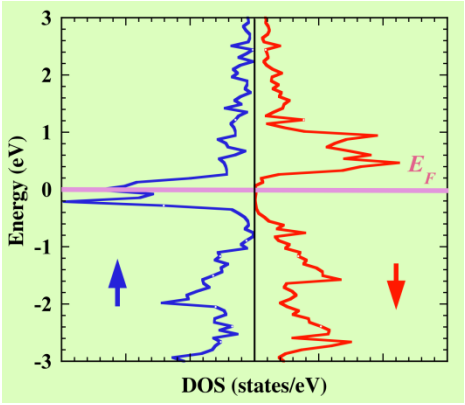
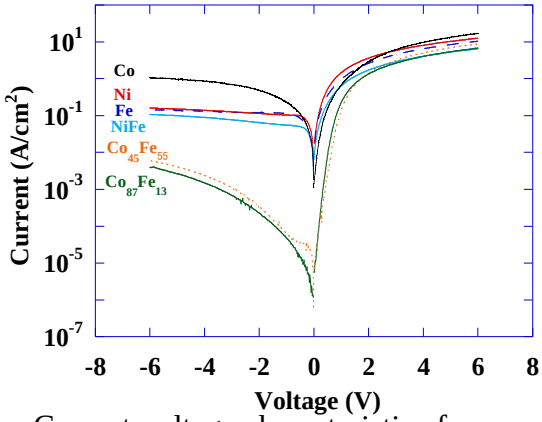
Development of half-metallic and multiferroic materials for non-volatile electronic devices

The aim of this reseach is to understand the mechanisms of gigantic response phenomena and quantum effects in nano-scale structures for the novel non-volatile electronic devices. The major topic of the research is the development of materials such as half-metals, which exhibit metallic properties in one spin channel and exhibit semiconducting behaviors in the other spin channel, and multiferroics, which are the combination of ferromagnetic and ferroelectric properties.



Fabrication of spin devices using diamond semiconductors

Spin transistors are logic devices with the functions of nonvolatile information storage by magnetoresistive effects. Placing a spin transistor inside usual silicon devices, for the use in computers, provides stability and minimizes data loss. We are fabricating spin transistors by a combination of ferromagnets and diamond semiconductors, which have superior characteristics such as long spin coherence length, high chemical stability, etc.



Current-voltage characteristics for ferromagnets/diamond semiconductors heterojunctions