強磁性体/酸化物界面におけるスピン緩和

Spin Relaxation at Ferromagnet/Oxide Interface

慶大理工[1]，○浅見　朗央[1]，○武者　輝[1]，安藤　和也[1]

Keio Univ.[1], ○Akio Asami[1], ○Akira Musha[1], Kazuya Ando[1]

E-mail: asamiakio@keio.jp

Spin-orbit torques arising from the spin-orbit coupling in solids enable current-induced magnetization switching in spintronic devices. The spin-orbit torques generally arise from spin-orbit coupling of heavy metals. However, even in a heterostructure where a metallic magnet is sandwiched by two different insulators, a nonzero spin-orbit torque is expected because of the broken inversion symmetry; an electrical insulator can be a source of the spin-orbit torques. Recently, we have demonstrated that oxygen incorporation into Pt turns the heavy metal into an electrically-insulating generator of the spin-orbit torques.[1] The experimental results show that spin-orbit torques originate from the spin-orbit coupling at the ferromagnet/Pt oxide interface.

In this study, we study the spin relaxation at the ferromagnet/Pt oxide. To investigate the spin relaxation at the interface between $Ni_{81}Fe_{19}$ and Pt oxide, we compared the magnetic damping of a $Ni_{81}Fe_{19}$/Pt-oxide bilayer with that of a $Ni_{81}Fe_{19}$/Cu/Pt-oxide trilayer, where the direct contact between the ferromagnet and Pt oxide is absent. Figure 1 shows the current-induced ferromagnetic resonance spectra for the $Ni_{81}Fe_{19}$/Pt-oxide bilayer measured at various frequencies. From the frequency dependence of the linewidth, we determined the magnetic damping of the $Ni_{81}Fe_{19}$/Pt-oxide bilayer and $Ni_{81}Fe_{19}$/Cu/Pt-oxide trilayer. We found that the magnetic damping of the $Ni_{81}Fe_{19}$/Pt-oxide bilayer is clearly larger than that of the $Ni_{81}Fe_{19}$/Cu/Pt-oxide trilayer, which demonstrates that the $Ni_{81}Fe_{19}$/Pt-oxide interface is an efficient spin-current absorber.

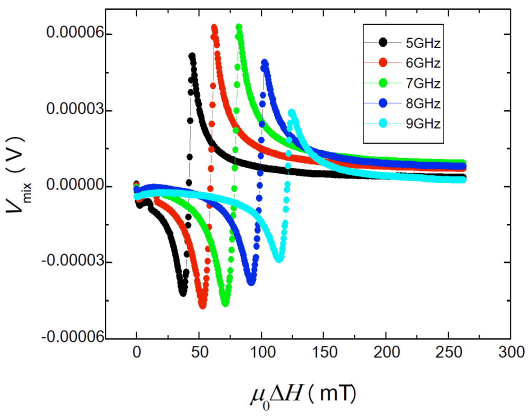

Figure 1. Current-induced ferromagnetic resonance spectra for the $Ni_{81}Fe_{19}$/Pt-oxide bilayer measured at various frequencies.

[1] H. An, Chen. *et al* 2017 cond-mat arXiv:1709.07127