

# 逆磁気キャパシタンス効果の発見

(北大電子研) 海住英生・西井 準治, (北大工) 長浜太郎, (東北大多元研) 北上 修, (Brown大) Gang Xiao

## Inverse Tunnel Magnetocapacitance in Fe/Al-Oxide/Fe<sub>3</sub>O<sub>4</sub>

Hideo Kaiju, Taro Nagahama, Shun Sasaki, Toshihiro Shimada, Osamu Kitakami, Takahiro Misawa, Masaya Fujioka, Junji Nishii & Gang Xiao

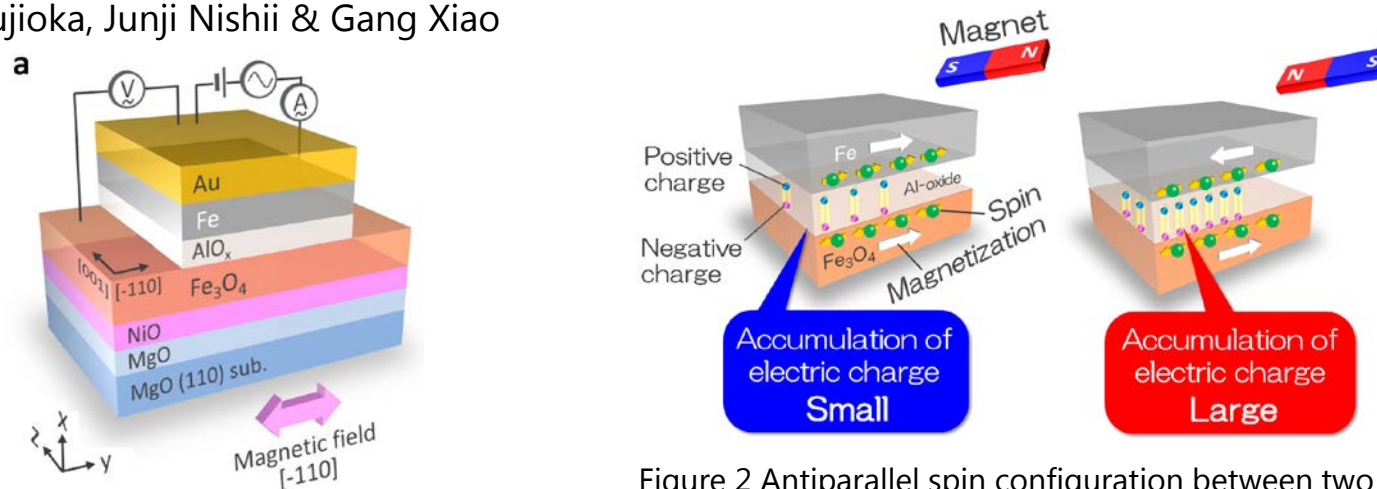


Figure 1 Experimental set-up and device structure.

Figure 2 Antiparallel spin configuration between two electrodes (Fe and Fe<sub>3</sub>O<sub>4</sub>) create more capacitance than parallel one, which is opposite to what is normally observed.

2つの磁性層の磁化が平行の時キャパシタンスが小さく、反平行の時大きくなる現象、逆磁気キャパシタンス効果を世界に先駆け発見しました。これは通常の磁気キャパシタンス効果とは全く逆の現象です。この成果は、新たな電気容量検出型の高感度磁気センサー・磁気メモリー誕生への道を切り拓くものです。

We have discovered the inverse tunnel magnetocapacitance (TMC) effect for the first time in Fe/AlO<sub>x</sub>/Fe<sub>3</sub>O<sub>4</sub> magnetic tunnel junctions (MTJs). The theory based on the Debye-Fröhlich predicts that the inverse TMC could potentially reach 150% in MTJs with positive and negative spin polarization of 65% and -42%, respectively. Inverse TMC will open up broader opportunities for device applications, such as magnetic logic circuits and multi-valued memory devices.