

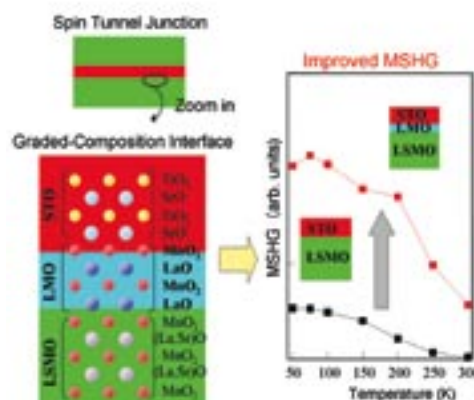
Interface Engineering in Strongly Correlated Electron Oxides

Hiroyuki YAMADA

Correlated Electron
Research Center
e-mail:

hiroyuki-yamada@aist.go.jp
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The spin tunnel junction with perfectly spin-polarized ferromagnet $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$ (LSMO) can be one of the best candidates for magnetic random access memory. However, in the actual junctions, e.g. LSMO/SrTiO₃ (STO)/LSMO, only an inferior tunnel magnetoresistance has been observed. We have succeeded in probing the local magnetic properties at the magnetic heterointerface by Magnetization-induced Second Harmonic Generation (MSHG), and we confirmed that the interface ferromagnetism is deteriorated at the LSMO/STO interface. We have shown that by grading the doping profile on an atomic scale at the interface, robust ferromagnetism can be realized even around room temperature, which leads to the improvement of the performance of spin tunnel junctions.



Atomic structure of graded-composition interface and its gigantic MSHG

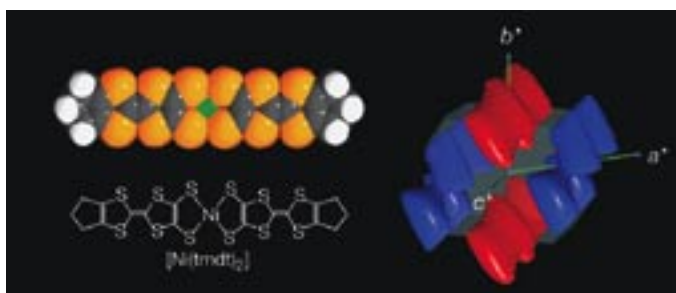
Observation of Fermi Surfaces in a Single-Component Molecular Metal

Hisashi TANAKA

Nanotechnology
Research Institute
e-mail:

hisashi.tanaka@aist.go.jp
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The realization of a molecular metal based on the crystallization of single-component, neutral molecules is a long standing quest. We report direct experimental evidence for the Fermi surface in $[\text{Ni}(\text{tmdt})_2]$, by detecting the quantum oscillations in magnetization. Torque magnetometry measurements of single crystals of $[\text{Ni}(\text{tmdt})_2]$, using a sensitive microcantilever at low temperatures in high magnetic fields to 45 T revealed dHvA oscillatory signals, for all directions of magnetic field, indicating the presence of electron and hole Fermi surfaces. These findings are consistent with band structure calculations, leaving no doubt that $[\text{Ni}(\text{tmdt})_2]$ is a single-component molecular metal in the most rigorous sense.



Molecular structure of $[\text{Ni}(\text{tmdt})_2]$ and calculated Fermi surfaces