Abstract
Experimental evidence for zero bias anomalies (ZBA) is presented in tunnel junctions with para-substituted benzoic acid derivatives self-assembled on the aluminum oxide surfaces. This ZBA indicated a transport process - as yet unreported to our knowledge - due to spin-dependent scattering by organic radicals rather than metallic magnetic impurities formed at metal-organic interfaces. The magnetic field and temperature dependence of the ZBA can be explained by the Appelbaum model. Based on the measurements in a magnetic field, the g value can be estimated from conductance measurements.

Field Dependence of Conductance

ZBA in Al-AlOx-4-Iodo-Benzoic acid-Co Junction

The magnetic field and temperature dependence of the ZBA can be explained by the Appelbaum model. Based on the measurements in a magnetic field, the g value can be estimated from conductance measurements.

Temperature Dependence of Conductance

IETS was utilized to study the molecular structure in the barrier. During the tunneling process, when the tunneling electron exchanges momentum with the molecule, it will lose energy to excite the vibration of the molecules; this is an inelastic process.

Conclusions

- Spin-dependent scattering is due to the unpaired electrons (organic radicals) formed at metal-organic interfaces.
- These results are important for determining molecules used in the tunnel junction and for the future study in organic spintronics field.

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