Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Magnetic anisotropy and high-spin effects in single-molecule transistors ALEXANDER ZYAZIN, TU Delft, JOHAN VAN DEN BERG, EDGAR OSORIO, NIKOS KONSTANTINIDIS, MARTIN LEIJNSE, FALK MAY, WALTER HOFSTETTER, CHIARA DANIELI, ANDREA CORNIA, MAARTEN WEGEWIJS, HERRE VAN DER ZANT — Fabrication of single-molecule transistors where electron transport occurs through an individual molecule has become possible due to the recent progress in molecular electronics. Three-terminal configuration allows charging molecules and performing transport spectroscopy in multiple redox states. Single-molecule magnets combining large spin with uniaxial anisotropy are of special interest as appealing candidates for high density memory applications and quantum information processing. We study single-molecule magnets Fe_4. Three-terminal junctions are fabricated using electromigration of gold nanowires followed by a self-breaking. High-spin Kondo effect and inelastic cotunneling excitations show up in transport measurements. Several excitations feature the energy close to the energy of zero-field splitting (ZFS) of a ground spin multiplet in bulk. This splitting is caused by the anisotropy and is a hallmark of single-molecule magnets. We observe nonlinear Zeeman effect due to a misalignment of an anisotropy axis and a magnetic field direction. The ZFS energy is increased in oxidized and reduced states of the molecule indicating enhancement of the anisotropy in these states.

Alexander Zyazin
TU Delft

Date submitted: 18 Nov 2010 Electronic form version 1.4