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Simple molecules as benchmark systems for molecular electronics

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Stellingen

Behorende bij het proefschrift van D. Djukic

Simple molecules as benchmark systems for molecular electronics

1. The stretching dependence of vibration frequencies in single-molecule junctions can be used to distinguish between transversal and longitudinal modes of vibration of the molecular junction.
This thesis (chapter 2) and Phys. Rev. B. **71** 161402(R) (2005).
2. In Pt-H-H-Pt molecular junctions, the H₂ molecule is positioned along the axis of the contact. The conductance in this configuration is close to the quantum unit conductance and is predominantly carried by a single entirely transparent conductance channel.
This thesis (chapter 2 and chapter 3) and Nano Lett. 2006, **6**(4) 789-793.
3. Experiments with HD molecular junctions provide evidence that molecular hydrogen can dissociate and recombine again in molecular form in the vicinity of the contact even at cryogenic temperatures (4.2K).
This thesis (chapter 2).
4. Anomalous peaks in the differential conductance for single-molecule junctions can be exploited as evidence for vibration modes in the junction that are coupled to two- level fluctuations.
This thesis (chapter 7).
5. When a Rh(001) surface is exposed to borazine (HBNH)₃ vapours at a temperature of about 1100K, a highly regular hexagonal boron nitride superstructure with periodicity of 3 nanometers is formed on the surface, which is most likely a single atomic layer.
M.Corso *et al.* Science, **303** (2004) 217
6. Scattering of bulk electrons on defects situated below a metal surface should cause identifiable conductance fluctuations in scanning tunnelling spectroscopy measurements, enabling precise determination of the positions of these defects.
Ye.S.Avotina *et al.* Phys. Rev. B. **71**, 115430 (2005)

7. The splitting of the mode-locking peaks in thin films of amorphous-MoGe provides direct information about the velocity distribution of the coherently moving fraction of the vortex lattice.

T.G. Sorop, N. Kokubo, P.H. Kes (in preparation)

8. Similar to weak localisation in mesoscopic physics, weak localisation exists in seismic waves where it results from the multiply scattered waves on inhomogeneities in the soil.

E. Larose *et al.* Phys. Rev. Lett. **93**, 0485011 (2004).