

ESR-STM: a tool for chemical analysis on the atomic scale and for studying single spin physics

ESR-STM (called also ESN-STM) is a technique where the high frequency noise in the tunneling current is detected. The detection is done at the Larmor frequency. This technique is now able to provide spectroscopic information on the single atom level. In the talk, the development of ESR-STM over the years will be described, together with the instrumental aspects. Special emphasis will be given to recent results on SiC surfaces:

Clean and C-contaminated Si(111) 7x7 surfaces were investigated with ESR-STM following exposure to 0.1L of O₂ at room temperature. The single spin spectra were integrated and summed, initially, from different positions. In the clean Si(111)7x7 a sum of a strong $g=1.99$, 10MHz wide dangling bond spectrum and a weak SiC spectrum with $g=2.006$ and $A=9\text{MHz}$ is observed. The SiC part is stronger in C-contaminated Si(111)7x7. Field and frequency sweeps give similar results. Looking at single positions, a neighboring ²⁹Si atom could be detected, Coherent transport with inelastic spin flips can explain the lineshape.

Finally, future possibilities and potential will be discussed.