

Master Thesis Project (Experimental-6 months):

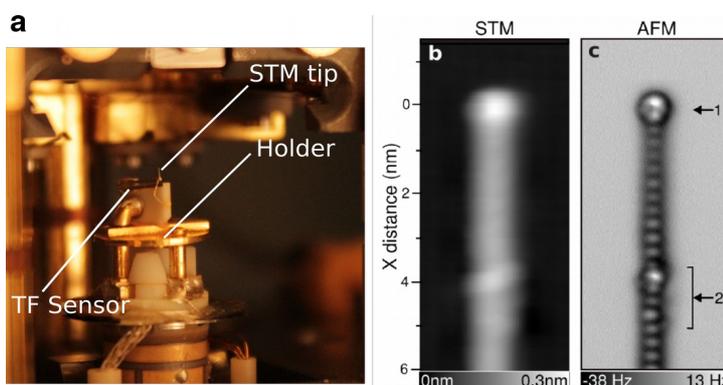
Design of new sensors for single atom/molecule investigations by atomic force microscopy

Introduction

The recent advances in atomic force microscopy (AFM) operated at low temperature (5K) rely on the use of piezoelectric sensors (tuning forks) which allow the acquisition of high-resolution images of atomic and molecular structures at the atomic scale. Such fundamental studies are of particular importance in the field of Physics, Chemistry and nanotechnology.

The project

This master project is dedicated to the study of single molecules with home-built AFM sensors for such low-temperature atomic force microscope (AFM). In the first part of the project, you will be in charge of assembling sensors consisting of a TF sensor with a STM tip glued on a specific tip holder (See figure a). In a second part, you will be introduced to the low temperature microscope under ultra high vacuum where you will learn scanning tunneling microscopy (STM) and AFM as well as their related spectroscopic techniques. The experiments will be conducted with your home-made sensors on single molecules adsorbed on atomically-cleaned surfaces with the aim of obtaining sub-molecular resolutions. The details of the research topic will be discussed with the candidate.



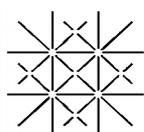
a. Head of the microscope with the force sensor. b-c, STM and AFM picture of monoatomic chain of Fe atoms on Pb(110).

Requirements

- Correct background in Physics and Chemistry
- High motivation and the ability to work independently

What we offer

- Learn the most advanced STM/AFM techniques as well as ultra high vacuum (UHV) and low temperature systems for surface science investigations
- Interact with challenging experiments on molecular and atomic systems
- Learn basics in collecting, processing and analysing data
- Personal supervision by researchers of the group of Prof. E. Meyer



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