



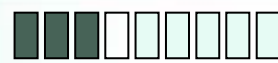
# Atomic Force Microscopy & Au film Roughness

16 april 2007

Daan Boltje

# Contents

- ▶ Introduction
  
- ▶ AFM
  - *Contact*
  - *Tapping (1)*
  - *Tapping (2)*
  - *Contact vs. Tapping*
  
- ▶ Au film roughness
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  - *Preliminary results*
  
- ▶ Conclusion



## ▶ Sputtering

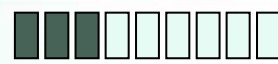
- *ATC-1800*
- *Pressures 2, 5, 10 mTorr*
- *Argon-Oxygen relation 0 to 50%, steps of 10%*

## ▶ AFM

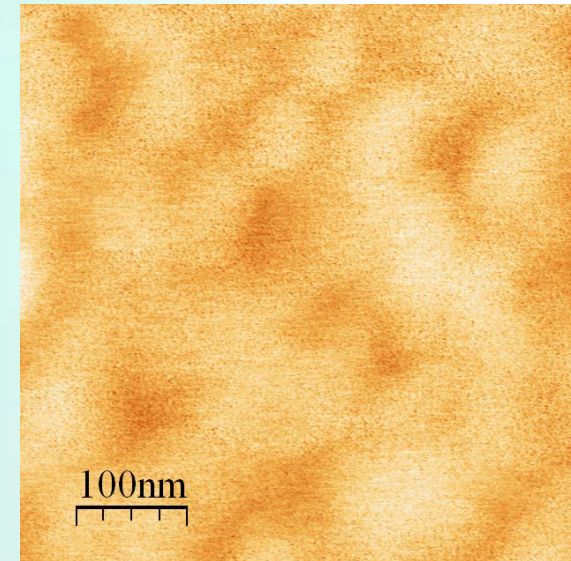
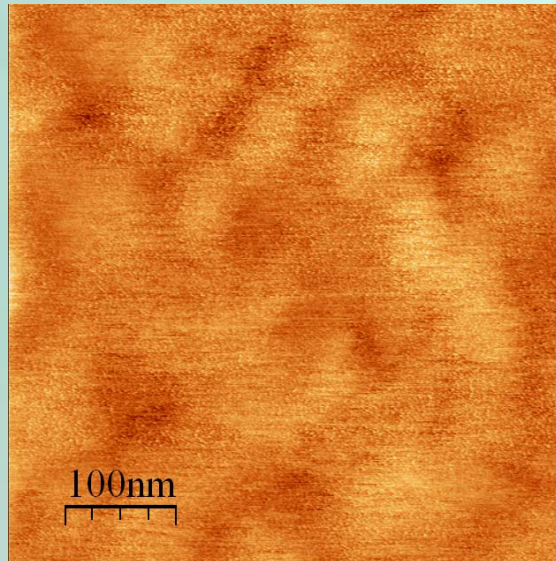
- *626 or 702?*
- *AFM Mode*

# Atomic Force Microscopy

- *Contact*

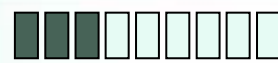


## ▶ First CM Result



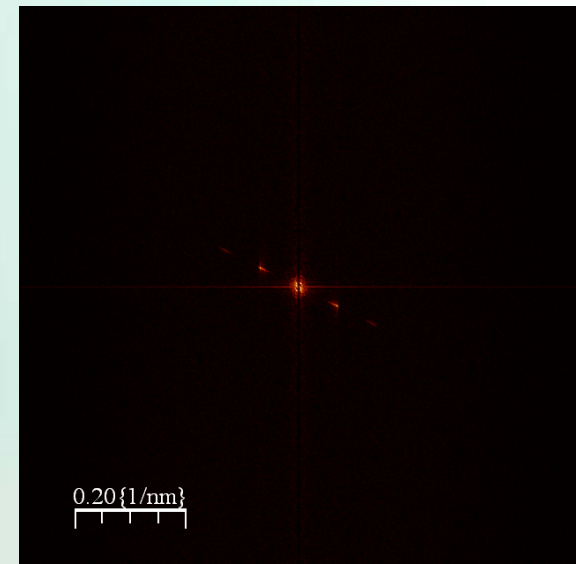
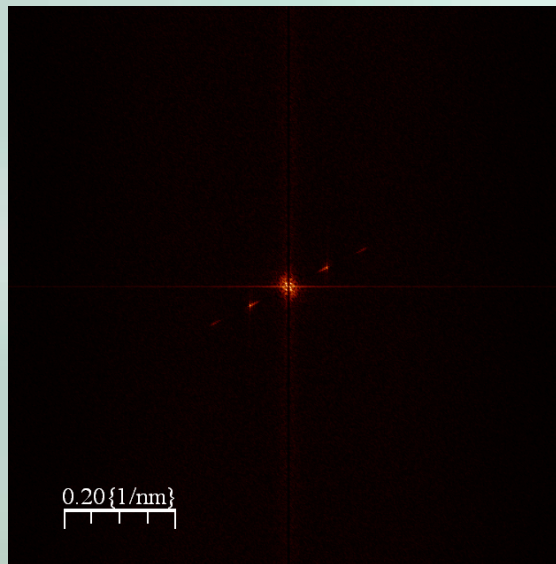
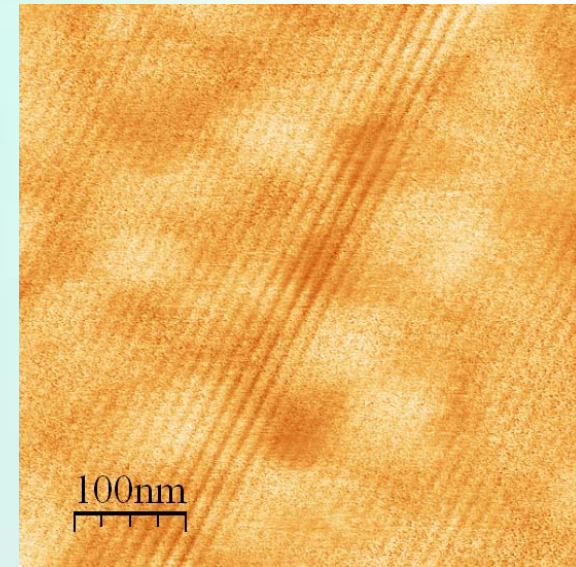
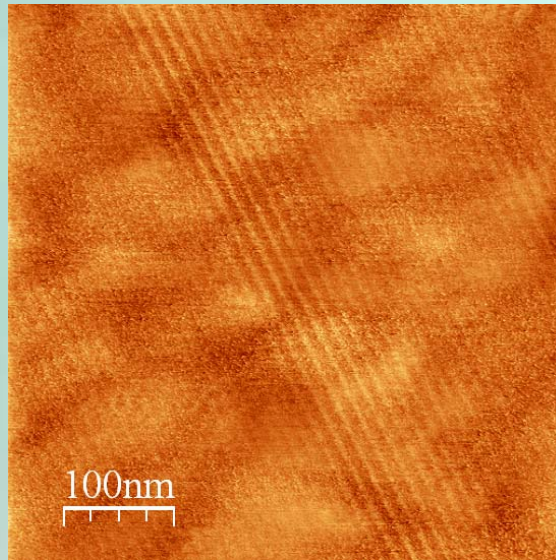
# Atomic Force Microscopy

- *Contact*



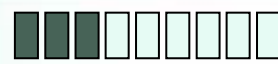
▶ First CM Result

▶ CM Oscillations



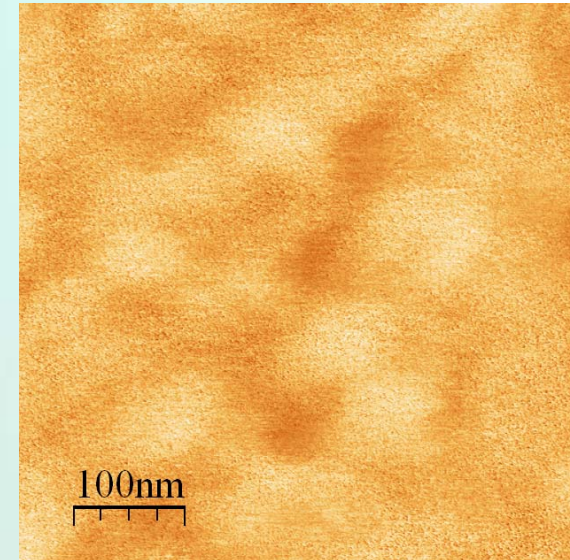
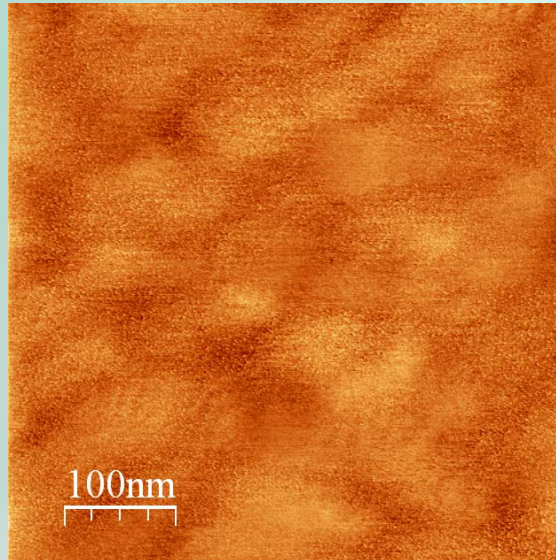
# Atomic Force Microscopy

- *Contact*



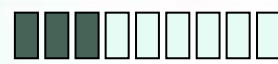
▶ First CM Result

▶ CM Oscillations

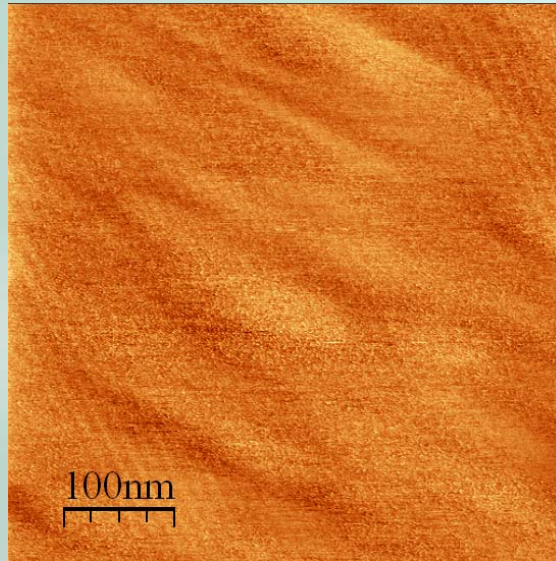


# Atomic Force Microscopy

- *Contact*



- ▶ First CM Result
- ▶ CM Oscillations
- ▶ Piezo drift



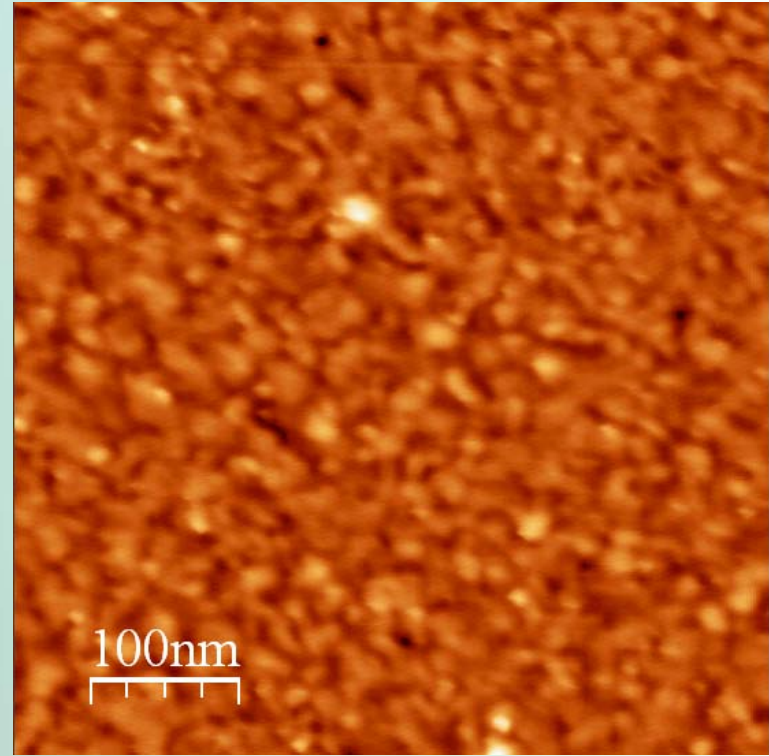
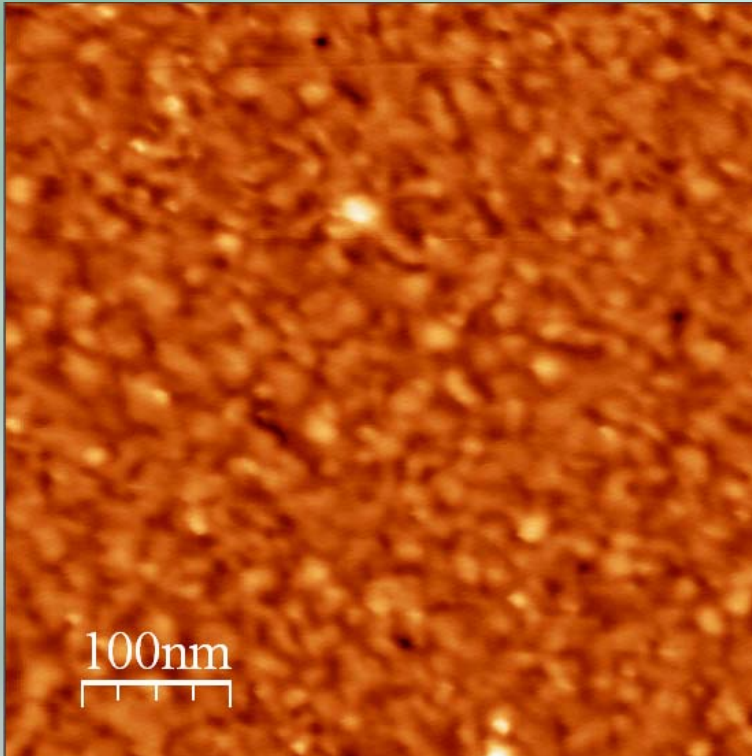


# Atomic Force Microscopy

## - Tapping (1)



- ▶ Tapping mode
  - *Random tip*

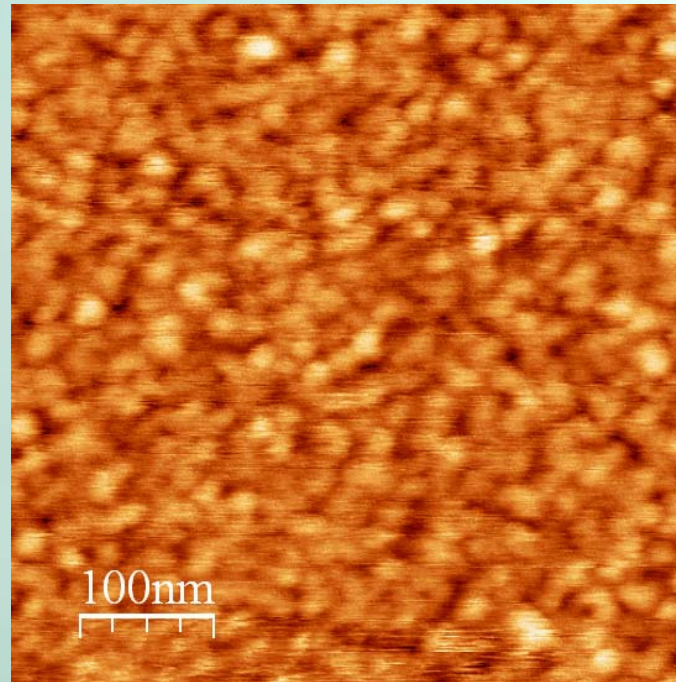
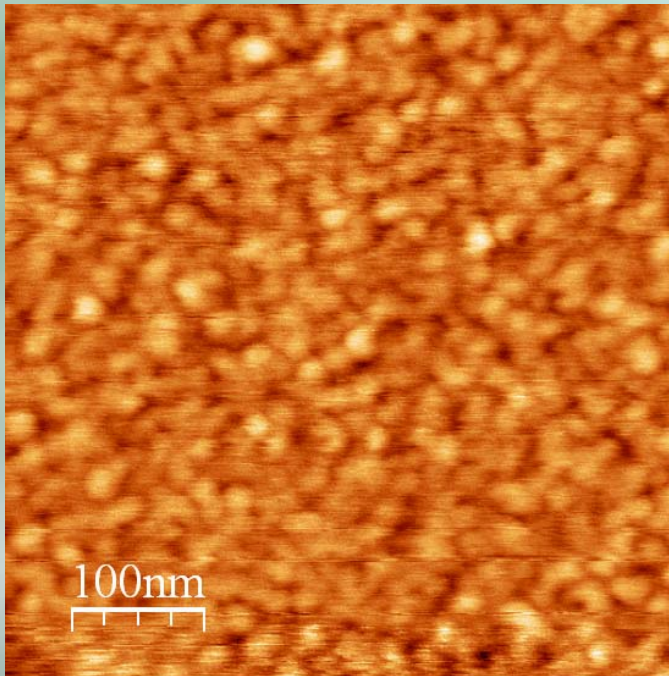


# Atomic Force Microscopy

## - Tapping (2)



### ▶ Tapping Mode



# Atomic Force Microscopy

## - *Contact vs. Tapping*



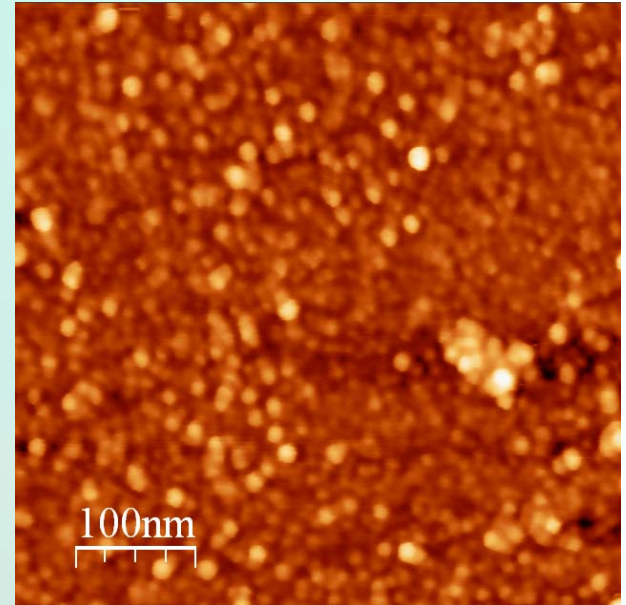
- ▶ Contact Mode
  - *Hard to adjust*
  - *Tip oscillations*
  - *Noise and distortion*
  
- ▶ Tapping Mode
  - *Easy to adjust*
  - *Fast scanning rate*
  - *Tip depended*
  
- ▶ Atomic Force Microscopy
  - *Many parameters*

# Au film Roughness

- *Method*



- ▶ AFM
- ▶ Roughness analysis
  - *RMS Roughness*



# Au film Roughness

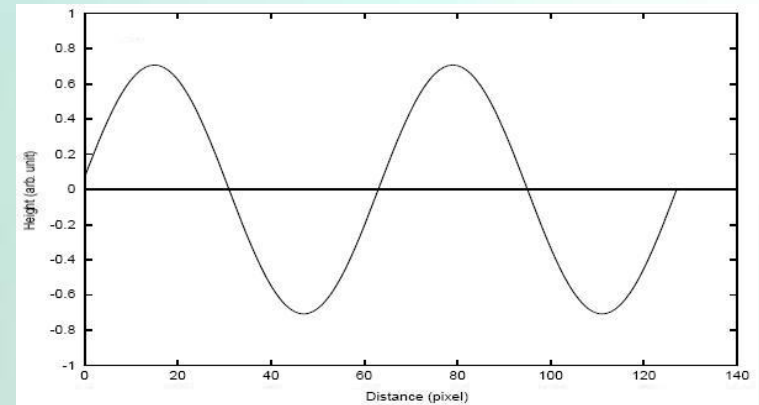
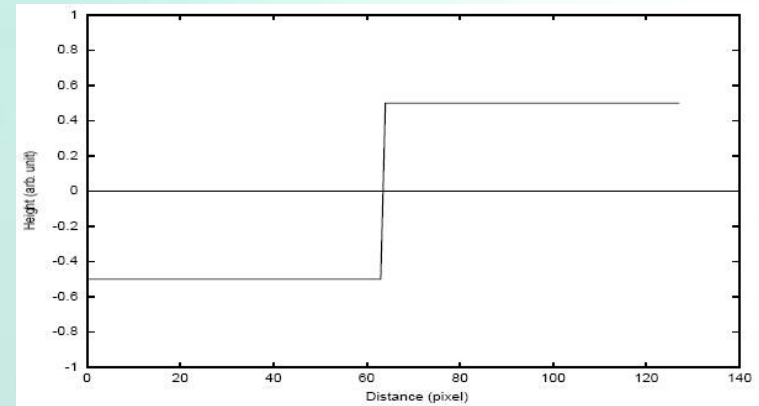
- Method



▶ AFM

▶ Roughness analysis

- *RMS Roughness*
- *RMS + Surface structure*



# Au film Roughness

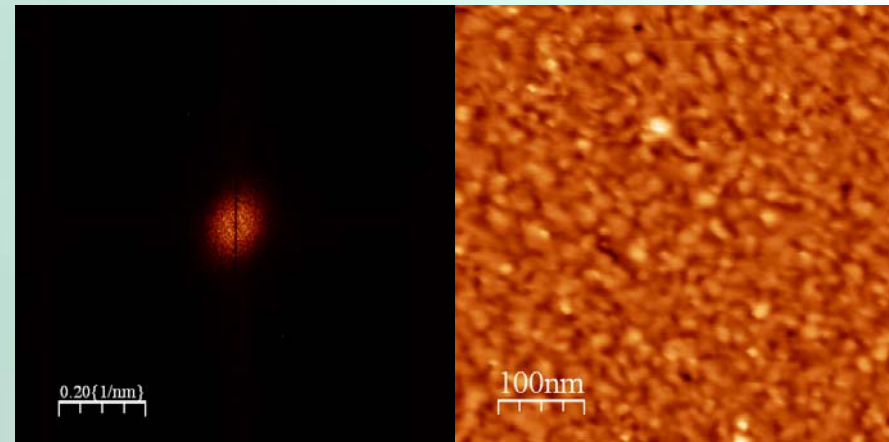
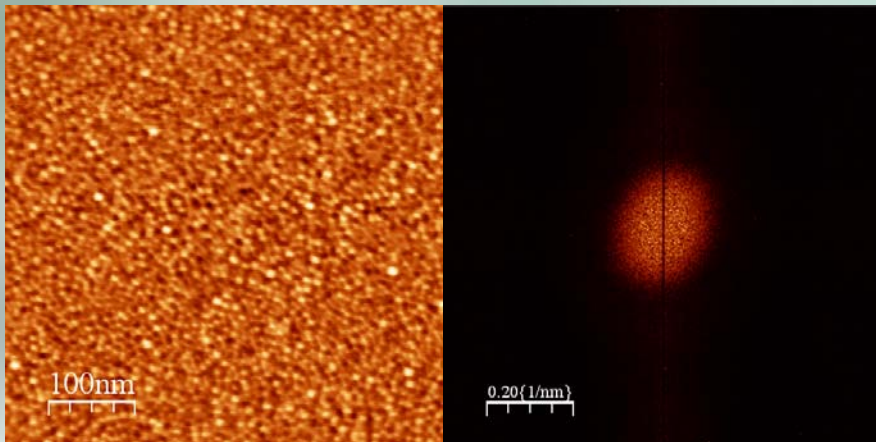
- *Method*



## ▶ AFM

## ▶ Roughness analysis

- *RMS Roughness*
- *RMS + Surface structure*
- *2D FFT*

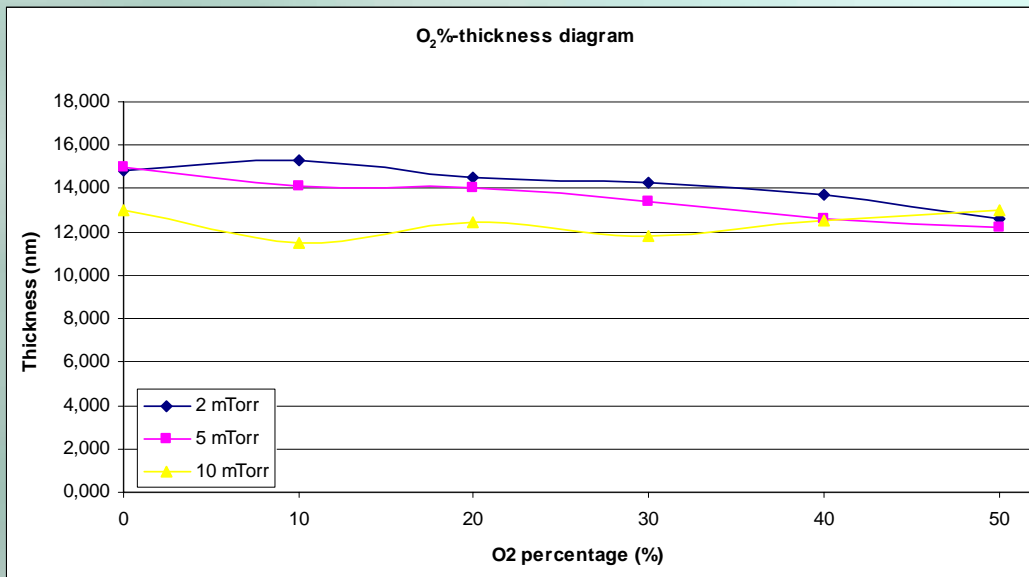


# Au film Roughness

- Preliminary results



## ▶ Sample thickness



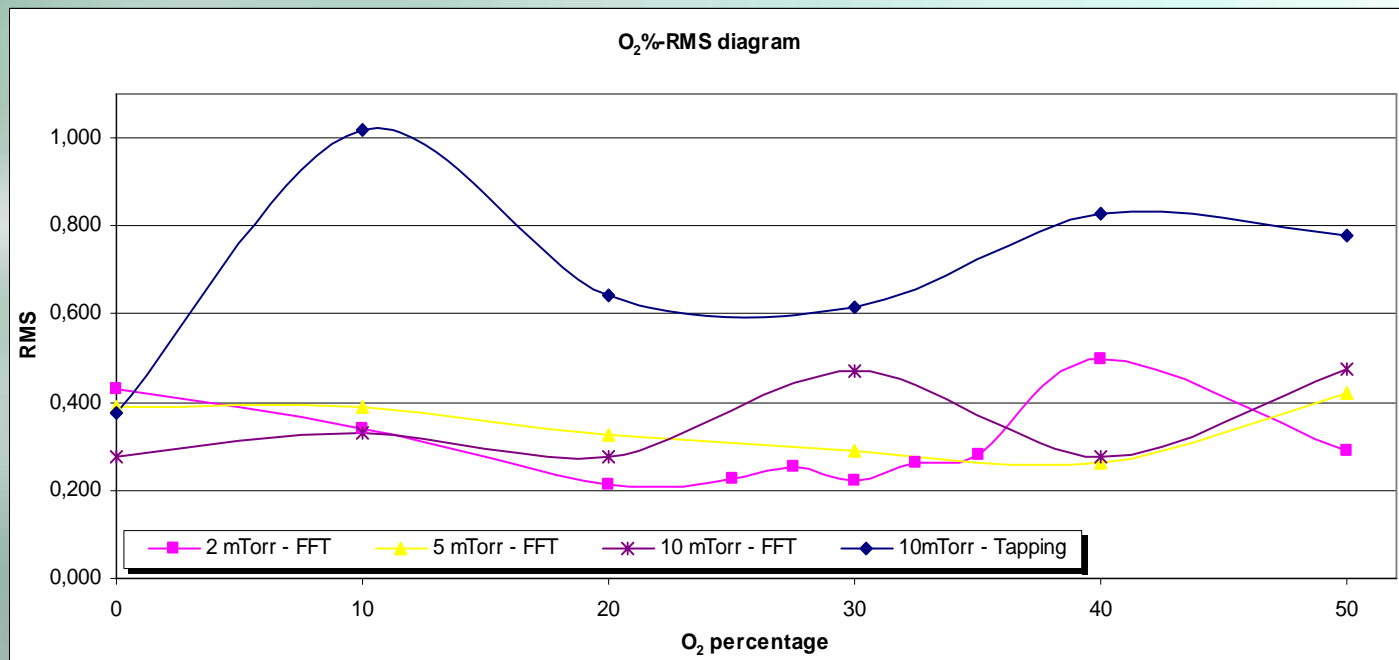
# Au film Roughness

- Preliminary results



▶ Sample thickness

▶ Sample Roughness







- ▶ AFM
  - *Tapping mode*
  - *Parameters*
  
- ▶ RMS roughness
  - *Not definite*
  - *Check on larger scale*

