

# CO absorption of Au on h-BN

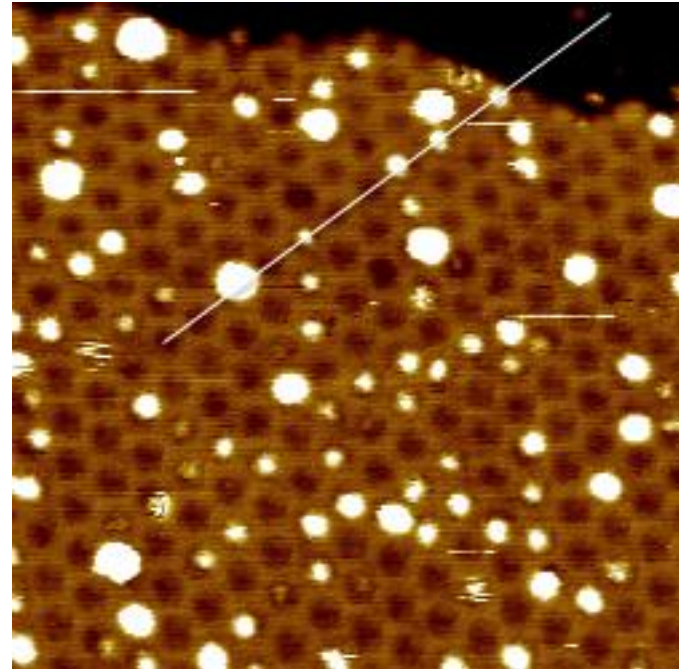
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# Background

- Au nanoclusters are more reactive than bulk Au
- Au nanoclusters are supported on h-BN to:
  - Provide locations for controlled growth
  - Isolate the nanoclusters from the substrate

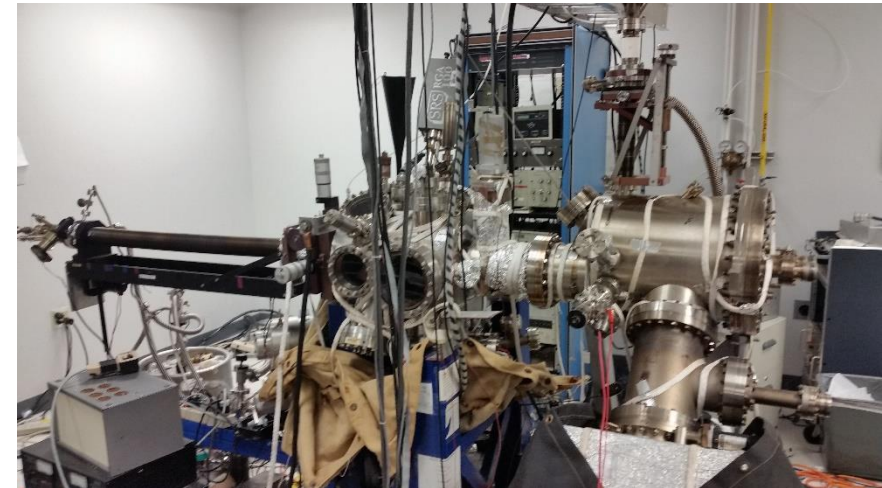
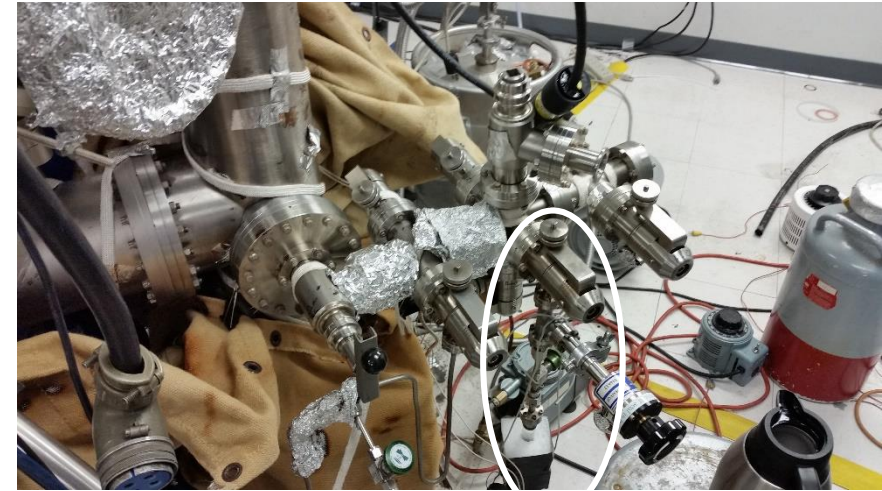


STM Image (50 x 50 nm) of 0.16 ML Au on h-BN nanomesh on Rh(1110) [5].

Patterson, M.; Habenicht, B.; Kurtz, R.; Liu, L.; Xu, Y.; Sprunger, P. Formation and stability of dense arrays of Au nanoclusters on hexagonal boron nitride/Rh(111). *Physical Review* **2014**, *89*, 205423.

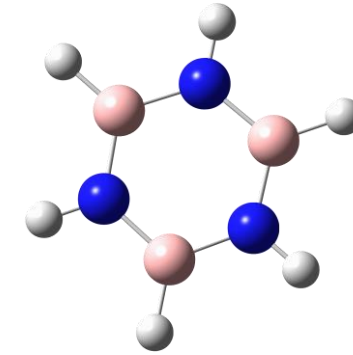
# Setup

- Ultra High Vacuum (UHV)
  - $\sim 10^{-10}$  torr
- Borazine chilled to  $\sim 10$  C
- Rh(111) is cleaned by cycles of sputtering and flashing
  - Sputter gas: Ne
  - Flashing Temperature:  $\sim 900$  C

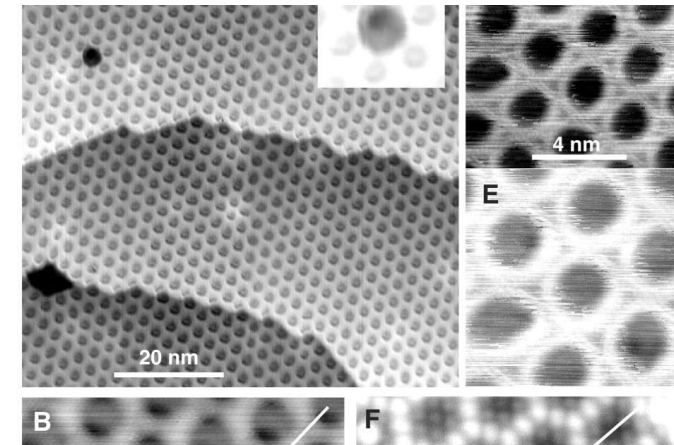


# Procedure

- 100L Borazine is dosed with the sample at 750 C
  - 1L = 1 s at  $10^{-6}$  torr
- Sample is cooled down to -180C with liquid Nitrogen
- Varying coverages of Au deposited on h-BN layer
- Dosed with 100L of CO
- EELS spectra is taken (at -180 C)



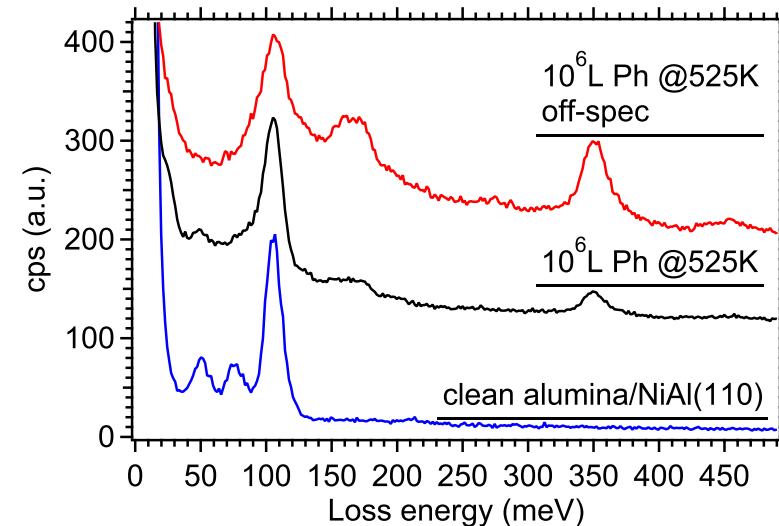
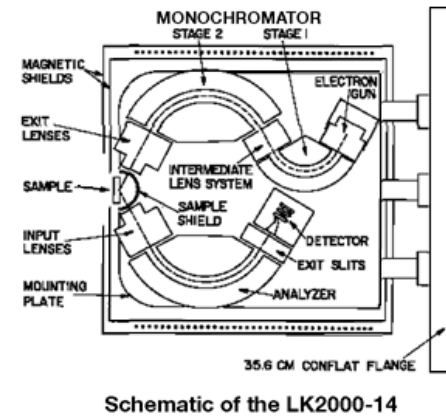
borazine –  
precursor  
Grow *h*-BN by  
pyrolysis



STM – hexagonal “nanomesh”  
with pores ~2.5 nm diameter (M.  
Corso, W. Auwärter, M. Muntwiler, A.  
Tamai, T. Greber, and J. Osterwalder,  
*Science* **303**, 217 (2004).)

# Electron Energy Loss Spectroscopy (EELS)

- Electron in, electron out
- measure energy lost by scattered electron
- Low energy incident  $e^-$  ( $\sim 7\text{eV}$ ) vibrations
- Higher energy  $e^-$  ( $\sim 30\text{ eV}$ ) transitions



# Results

