TPD Procedure, H on Si(100)

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1. Set-up
   1. Pass 1 A of current through the sample to check contacts.
   2. Verify that TPD\_Controller.vi is communicating properly with instruments (only on first run since program was started, power supply leads should be disconnected).
      1. Lakeshore temperature controller
      2. Kepco power supply
      3. Mikron pyrometer
   3. Put sample in elevator.
   4. Outgas W filament.
      1. Filament position = 4.0cm
      2. Turn Variac to 10% for 5 min
      3. Turn Variac to 2%
      4. Filament position = 0cm.
   5. Move sample to prep chamber stage.
2. TPD on bare Si(100) with clean chamber.
   1. Input controller parameters/metadata.
      1. Metadata (all self-explanatory)
      2. Maximum values
         1. Maximum Current = 4 A
         2. Maximum voltage = 20 V
         3. Maximum temperature = 800 C
      3. Temperature Schedule
         1. 500C, 0s
         2. 500C, 10s
         3. 850C, 185s
      4. Gain Schedule
         1. Kc = .001, Ti = .2, Td = .0005, max time = 10s
         2. Kc = .0005, Ti = .1, Td = .0005, max time = 1000s
         3. PID calculates current
   2. Flash sample
      1. Heat sample to 1150 C for 60 s.
         1. Use Kepco power supply.
         2. Increase current to ~9 A, adjusting to attain final temperature.
         3. Measure temperature with HT Pyrometer.
         4. Keep an eye on thermocouple temperature, note if and when thermocouple breaks.
   3. Begin recording RGA data.
   4. Start temperature control program.
   5. Save temperature and RGA data after experiment finishes.
3. TPD on clean Si(100) with chamber exposed to atomic H.
   1. Input controller parameters/metadata.
      1. Metadata (all self-explanatory)
      2. Maximum values
         1. Maximum Current = 4 A
         2. Maximum voltage = 20 V
         3. Maximum temperature = 800 C
      3. Temperature Schedule
         1. 350C, 0s
         2. 350C, 50s
         3. 650C, 200s
      4. Gain Schedule
         1. Kc = .003, Ti = .1, Td = .001, max Temp = 0C
         2. PID calculates current
   2. Flash sample.
      1. Heat sample to 1250 C for 60 s.
         1. Use Kepco power supply.
         2. Increase current to ~9 A, adjusting to attain final temperature.
         3. Measure temperature with HT Pyrometer.
         4. Keep an eye on thermocouple temperature, note if and when thermocouple breaks.
   3. Put sample in elevator.
   4. Expose chamber to atomic H.
      1. Filament position = 4.0cm
      2. Begin recording RGA data.
      3. Veriac at 4%
      4. Flow H2 into chamber.
         1. 2\*10-6 torr for 4 minutes
      5. Veriac at 2%
      6. Filament position = 0cm
      7. Save RGA data.
   5. Put sample on prep chamber stage.
   6. Start temperature control program.
   7. Begin recording RGA data.
   8. Save temperature and RGA data after experiment finishes.
4. TPD on hydrogen-pacified Si(100) sample.
   1. Input controller parameters/metadata.
      1. Metadata (all self-explanatory)
      2. Maximum values
         1. Maximum Current = 4 A
         2. Maximum voltage = 20 V
         3. Maximum temperature = 800 C
      3. Temperature Schedule
         1. 400C, 0s
         2. 400C, 600s
      4. Gain Schedule
         1. Kc = .003, Ti = .1, Td = .001, max Temp = 0C
         2. PID calculates current
   2. Flash sample.
      1. Heat sample to 1250 C for 60 s.
         1. Use Kepco power supply.
         2. Increase current to ~9 A, adjusting to attain final temperature.
         3. Measure temperature with HT Pyrometer.
         4. Keep an eye on thermocouple temperature, note if and when thermocouple breaks.
   3. Start temperature control program.
   4. Expose sample and chamber to atomic H.
      1. Filament position = 4.0cm
      2. Begin recording RGA data.
      3. Veriac at 4%
      4. Flow H2 into chamber.
         1. 2\*10-6 torr for 4 minutes
      5. Veriac at 2%
      6. Filament position = 0cm
      7. Save RGA data.
   5. End temperature control program.
   6. Save temperature data.
   7. Input controller parameters/metadata.
      1. Metadata (all self-explanatory)
      2. Maximum values
         1. Maximum Current = 4 A
         2. Maximum voltage = 20 V
         3. Maximum temperature = 800 C
      3. Temperature Schedule
         1. 350C, 0s
         2. 350C, 50s
         3. 650C, 200s
      4. Gain Schedule
         1. Kc = .003, Ti = .1, Td = .001, max Temp = 0C
         2. PID calculates current
   8. Begin recording RGA data.
   9. Start temperature control program.
   10. Save RGA and temperature data when run is finished.