

Realization of Precise Heating Stage for On-Surface Synthesis

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Goal

Radiation Shield (Al)

Sample Stage (Al)

Introduction

On-Surface Synthesis:

- Coupling of Precursor Molecules
- on a surface (catalyst)
- without solvents
- thermally activated





- Experimental method to control and determine in UHV precise temperature with $\Delta T = \pm 5^{\circ}$.
- **Problem** Design of commercial sample holder with internal heating filament prevents precise, direct temperature measurement.
- **Solution** Design of UHV compatible oven for external thermocouple.







4-Bromo[5]Phenacene From MSc Thesis Wun-Chang Pan (NTHU, 2020) Diphenanthro[1,2-b:2',1'-n]perylene From MSc Thesis Wun-Chang Pan (NTHU, 2020)

Knowledge on precise Temperatures Gives access to Energies

Cross-Sectional View

Heating for sample stage

Rotation for Alignment

Linear Transfer for Sample Access (100 mm)

Thermally Isolating Mounting (SS)



High Temperature G4

Thermal Isolation (SS)

Ceramic Socket

Light Bulb for radiation heating

24V 50W

G4 Socket

Glass cover removed

- Cable exchanged (Kapton Isolated) -
- Modified crimp terminal (Tin removed)

Transfer rod Adaptor



P2-SL-061

Realization



Unisoku Sample Holder

Performance of heating



Summary

A Heating Stage was designed and realized for precise, temperature controlled annealing. In the initial testing, an undesirably long warm-up time (up to 1hr) is found. Considering the heating power, this can be expected from the sample stage weight and specific heat. Further improvements will include PID controlled heating to achieve faster warm up. The setup is now readily available for improved experiments on On-Surface Synthesis.