

Xuan Feng<sup>1,2</sup>, Aaman Akhtar Ahmed<sup>1,2</sup>, Germar Hoffmann<sup>1,2</sup>

<sup>1</sup>Department of Physics, National Tsing Hua University, Hsinchu, Taiwan

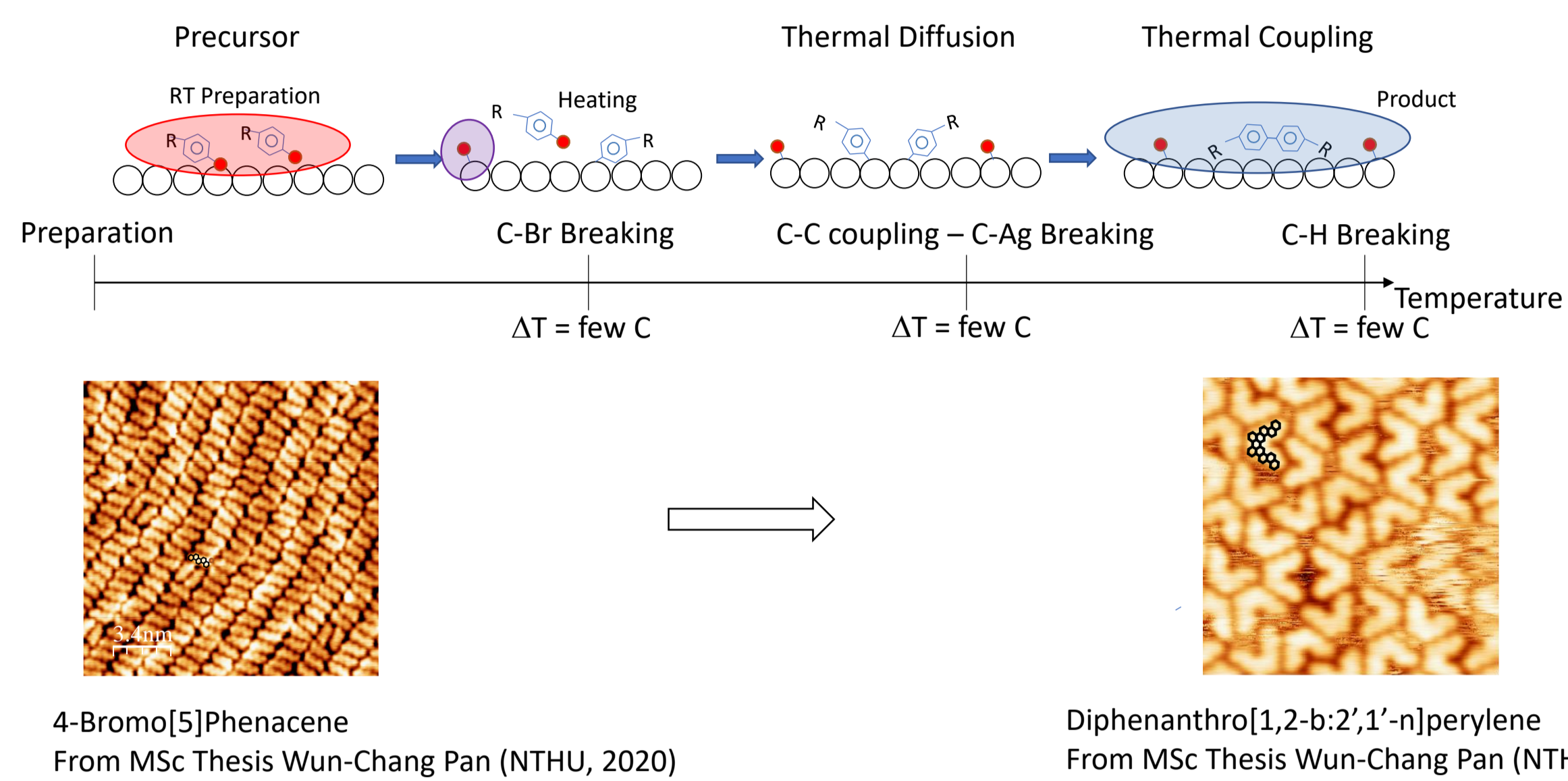
<sup>2</sup>Center for Quantum Technology, National Tsing Hua University, Hsinchu, Taiwan

## Introduction

### On-Surface Synthesis:

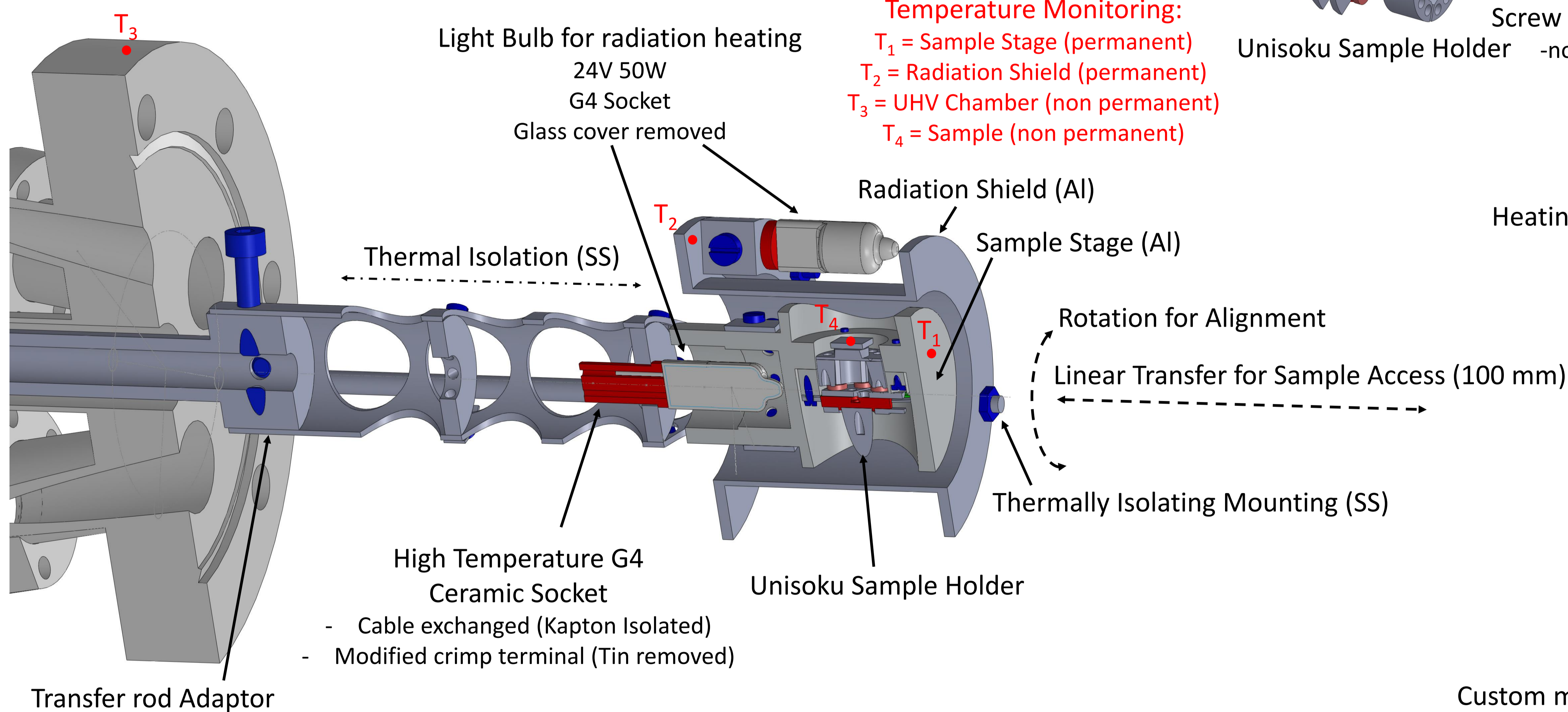
Coupling of Precursor Molecules

- on a surface (catalyst)
- without solvents
- thermally activated



Knowledge on precise Temperatures Gives access to Energies

## Cross-Sectional View



## Goal

Experimental method to control and determine in UHV precise temperature with  $\Delta T = \pm 5^\circ$ .

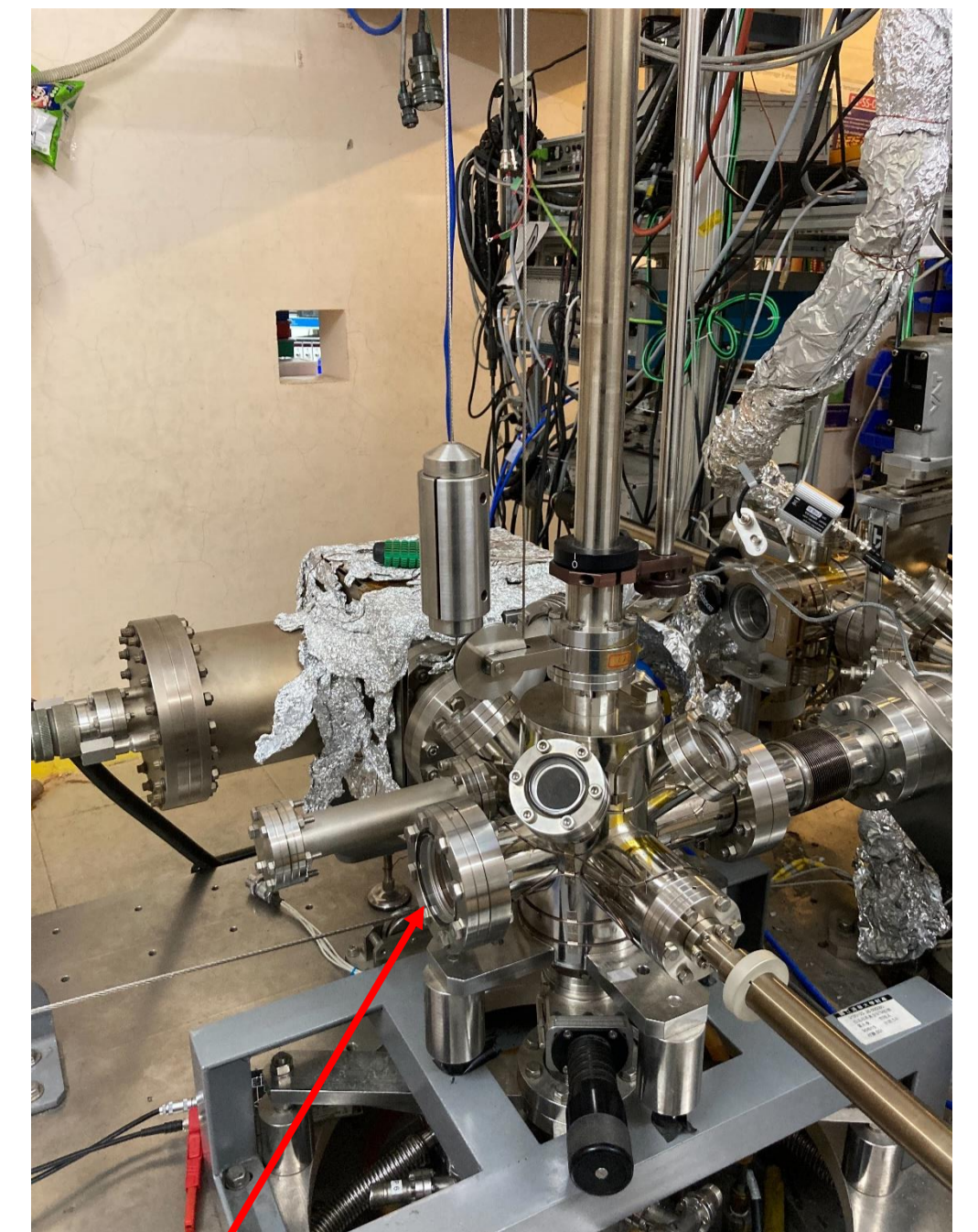
## Problem

Design of commercial sample holder with internal heating filament prevents precise, direct temperature measurement. Our experiment require better control.

## Solution

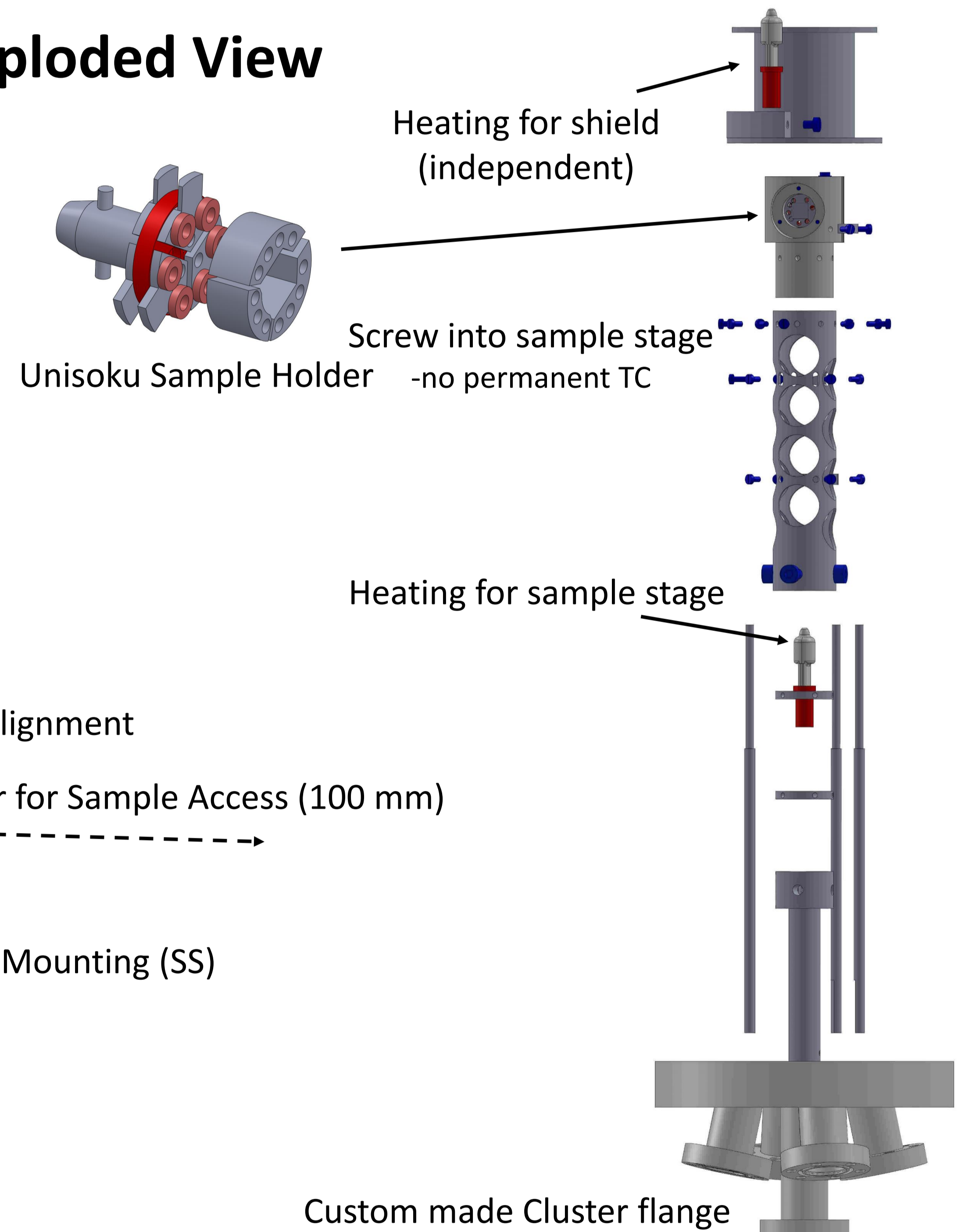
Design of UHV compatible oven for external sample heating and with permanently installed thermocouple.

During heating, sample is entirely covered and in thermal equilibrium with homogenously heated stage.

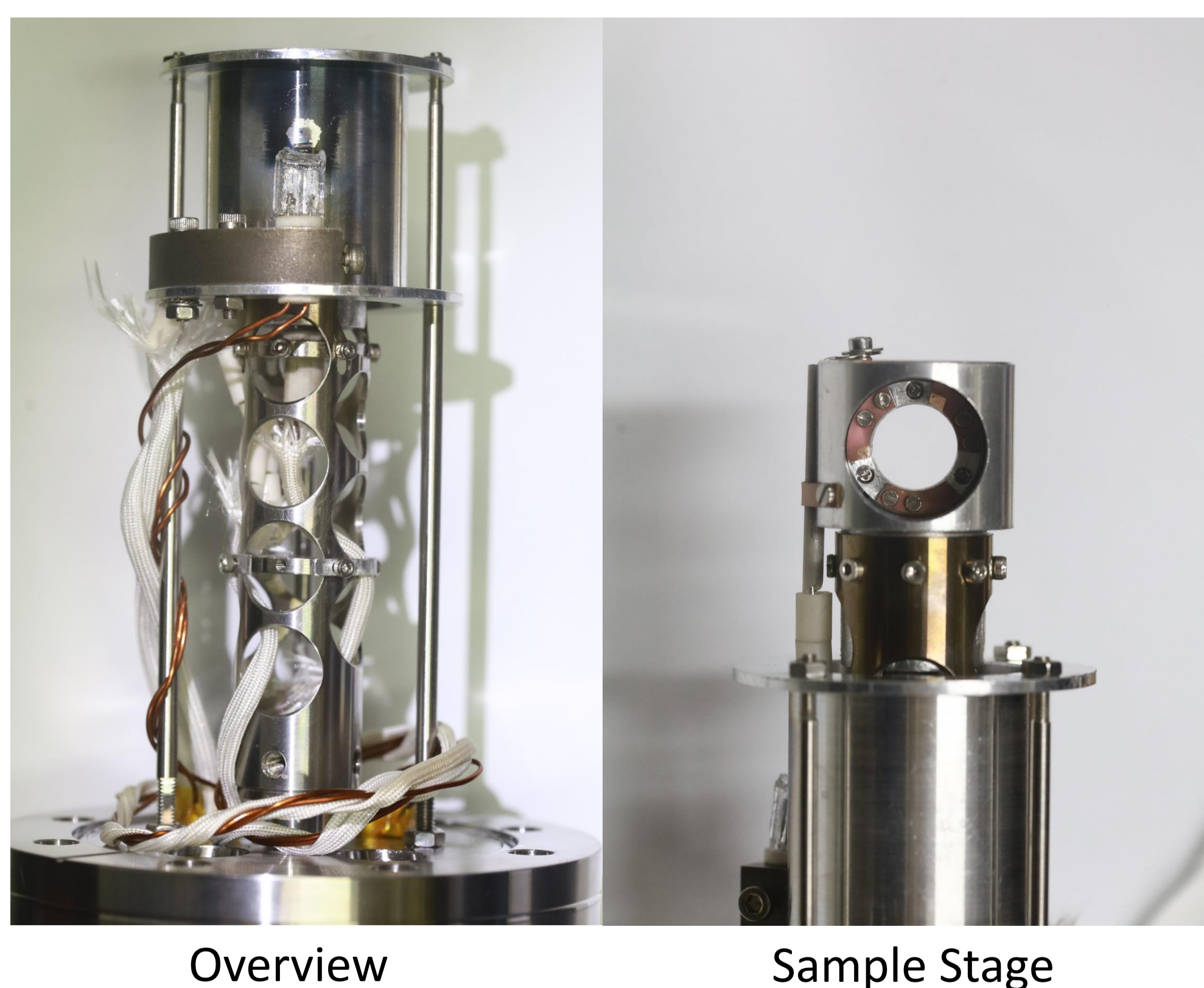


Heating Stage

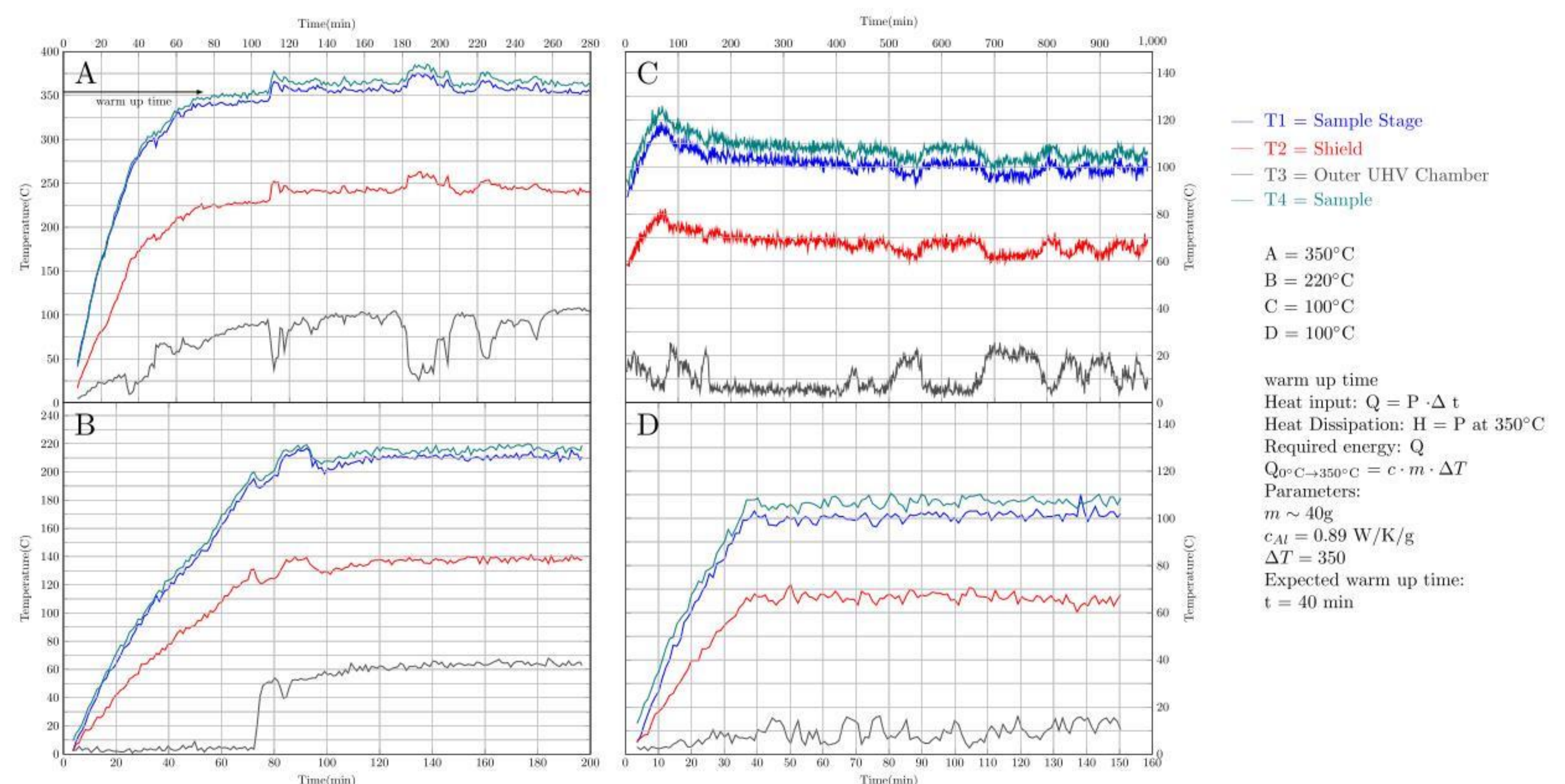
## Exploded View



## Realization



## 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.