

Realization of Precise Heating Stage for On-Surface Synthesis

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The synthesis of covalently coupled extended molecular structures in On-Surface Synthesis is a new, rapidly developing field of research and extends beyond the knowledge of classical chemistry. Organic molecules are chemically designed to host a reactive group. In contact with a catalytic surface, a chemical reaction of the reactive group is activated by an external stimuli and a new product by coupling is formed. External stimuli can be the local current in STM experiments, light, or, as most intensively studied, thermal excitation. The last decade has seen a tremendous development in the understanding of the physical processes, coupling processes, role of the catalyst, side products, selectivity, yield among others. Thereby, a precise temperature control is required.

We are studying such coupling reactions in a STM system. A direct measurement of low temperatures (50 – 350C) in a permanent installation is critical but not available and we rely on initial temperature calibration experiments ($\Delta T > \pm 20\text{C}$). Therefore, we designed a precise heating stage ($\Delta T < \pm 5\text{C}$) for mobile samples. The stage can be operated in ultra high vacuum (UHV) and covers a temperature range from 30C to 500C. During heating, samples are entirely covered in an UHV oven and the stage can be easily maintained. We will discuss the design, installation, and operation.

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