

Master Thesis
6 months

Electrospray deposition of graphene like and graphene like precursor molecules



Introduction:

This master project is dedicated to the imaging of molecular assemblies of graphene-like molecules (fig a) with the goal to compare them to the assemblies formed with the precursor molecules (fig b) and to previous assemblies obtained with different molecules (fig c) [1,2]. Graphene-like molecules are known to assemble in large islands, on surfaces [1,2]. We recently showed that due to their alkyl chains interactions, such assemblies present giant thermal expansion answer to a heat variation[2].

Here, we want to compare the assemblies formed by the two kinds of molecules. Additionally, upon on surface reaction, the precursor can undergo a cyclodehydrogenation process, leading to the on surface synthesis of the corresponding graphene like molecule.

To conduct the experiment, a modified commercial electrospray deposition setup will be used to safely introduce the molecules in UHV environment. Imaging will be performed using our home built room temperature AFM working in the non contact mode.

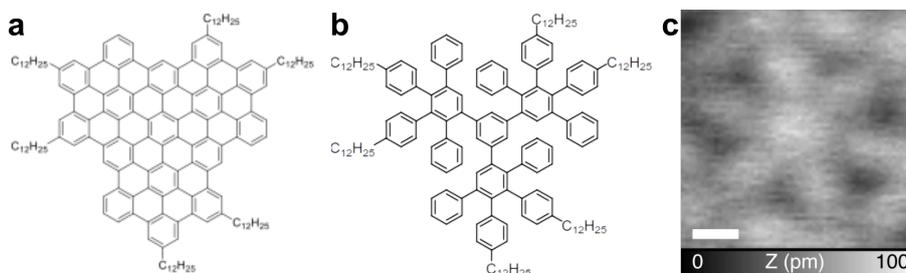


Figure: a) Graphene-like molecule. b) Precursor of the graphene-like molecule. c) ncAFM image of a similar molecule on Au(111) surface.

Requirements:

Correct background in Physics.

The wish to learn experimental laboratory work.

High motivation and the ability to work independently.

What we offer:

Learn the most advanced AFM techniques in ultra high vacuum environment as well as electrospray deposition.

Interact with challenging experiments on molecular systems.

Learn basics in collecting, processing and analyzing data.

Personal supervision by researchers of the group of Prof. E. Meyer.

Bibliography:

[1] A. Hinaut *et al.*, *Nanoscale*, 10, 2018, doi: [10.1039/C7NR06261C](https://doi.org/10.1039/C7NR06261C).

[2] S. Scherb *et al.*, *Commun Mater*, 1, 2020, doi: [10.1038/s43246-020-0009-2](https://doi.org/10.1038/s43246-020-0009-2).

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