

SELF-ASSEMBLY OF DENDRIMERS AND MACROCYCLES ON THE NANOMETRE SCALE

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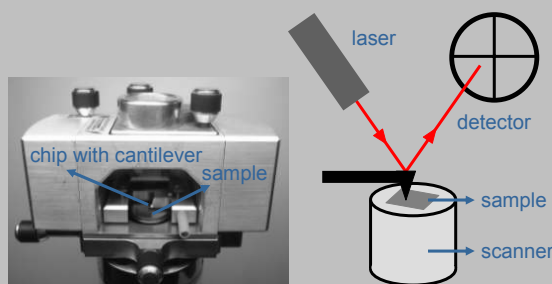
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INTRODUCTION

- Goal: surfaces with specific properties
- Method
 - self-assembly: process in which particles organise spontaneously to form more complex structures
 - molecule: symmetry, functional groups; solvent; concentration; substrate with / without patterns; sample preparation
 - scanning probe microscope

METHOD

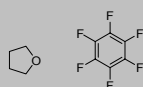
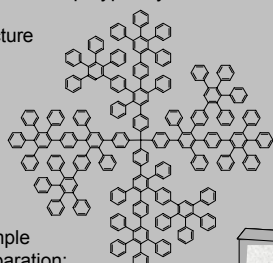
- Atomic Force Microscopy
 - topography
 - force interactions
 - sharp tip



RESULTS: DENDRIMER

- 2nd generation polyphenyl dendrimer

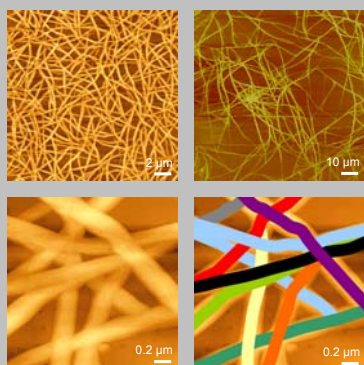
– Structure



– Sample preparation:

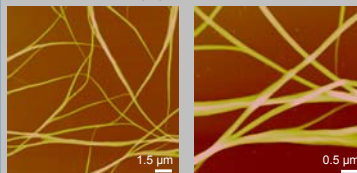
- drop casting a ~10⁻⁵ M solution in THF on silicon in a THF saturated tank

A) pure solvent: THF

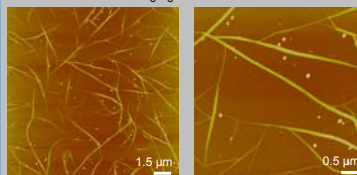


B) solvent mixtures: THF+C₆F₆

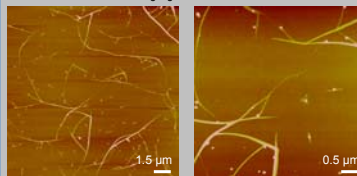
- mix1: 5% C₆F₆



- mix2: 10% C₆F₆

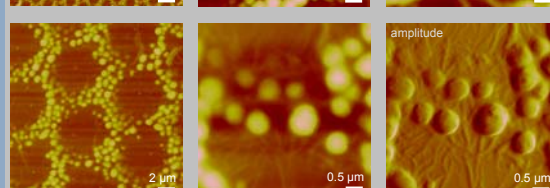
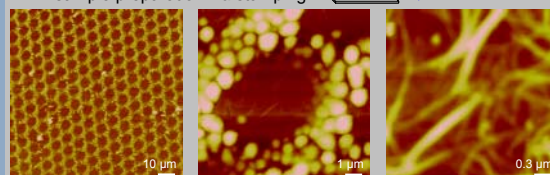


- mix3: 20% C₆F₆

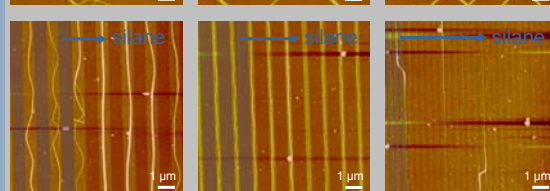
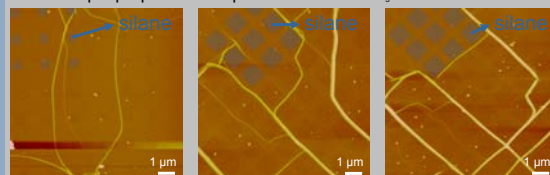


C) controlling self-assembly

- sample preparation via stamping



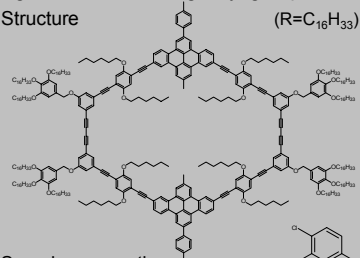
- sample preparation on patterned silicon: CF₃-terminated silane



RESULTS: MACROCYCLE

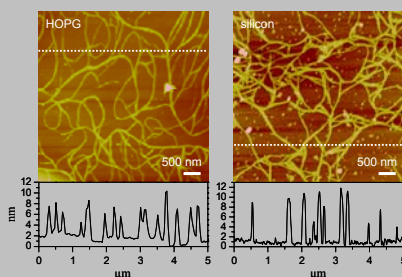
- Ring structure with long alkyl groups

– Structure



– Sample preparation:

- drop casting a ~10⁻⁴ M solution in 1,2,4-TCB on a substrate



CONCLUSION

- The dendrimer and macrocycle both form fibers despite their structural differences
- Dendrimer
 - driving force: π-π and van der Waals interactions among dendrimer branches
 - control of fiber orientation feasible
- Macrocycle
 - driving force: rigid core (π-π interactions) and alkyl chains