

## Preparation of Chiral Surfaces from Achiral Liquid Crystals?

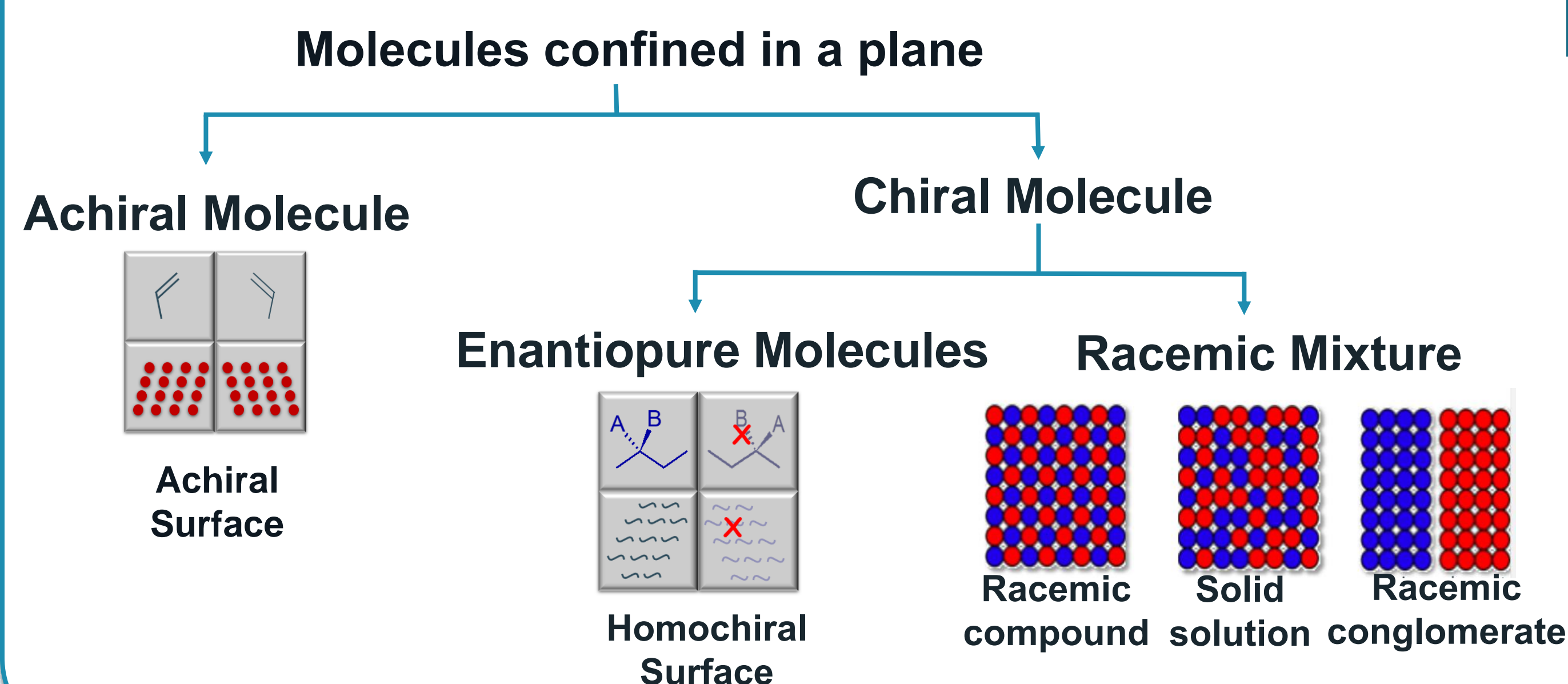
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**Liquid crystals (LC)** have been the subject of extensive research due to their unique characteristics and potential applications in various fields, including displays, sensors, and optical devices. The **cyanobiphenyl family**, which includes compounds like **4'-n-octyl-4-cyano-biphenyl (8CB)** and **4-cyano-4'-n-dodecylbiphenyl (12CB)**, that are **prochiral molecules**, has been widely investigated for their **assembly behaviour on different substrates** such as graphite and gold. These achiral molecules upon adsorption onto a solid surface **form chiral surfaces with domains of opposite handedness** as the 2D space hinders its conformational mobility, thereby also **breaking the molecular symmetry**.

### Expression of Chirality in Two Dimensions



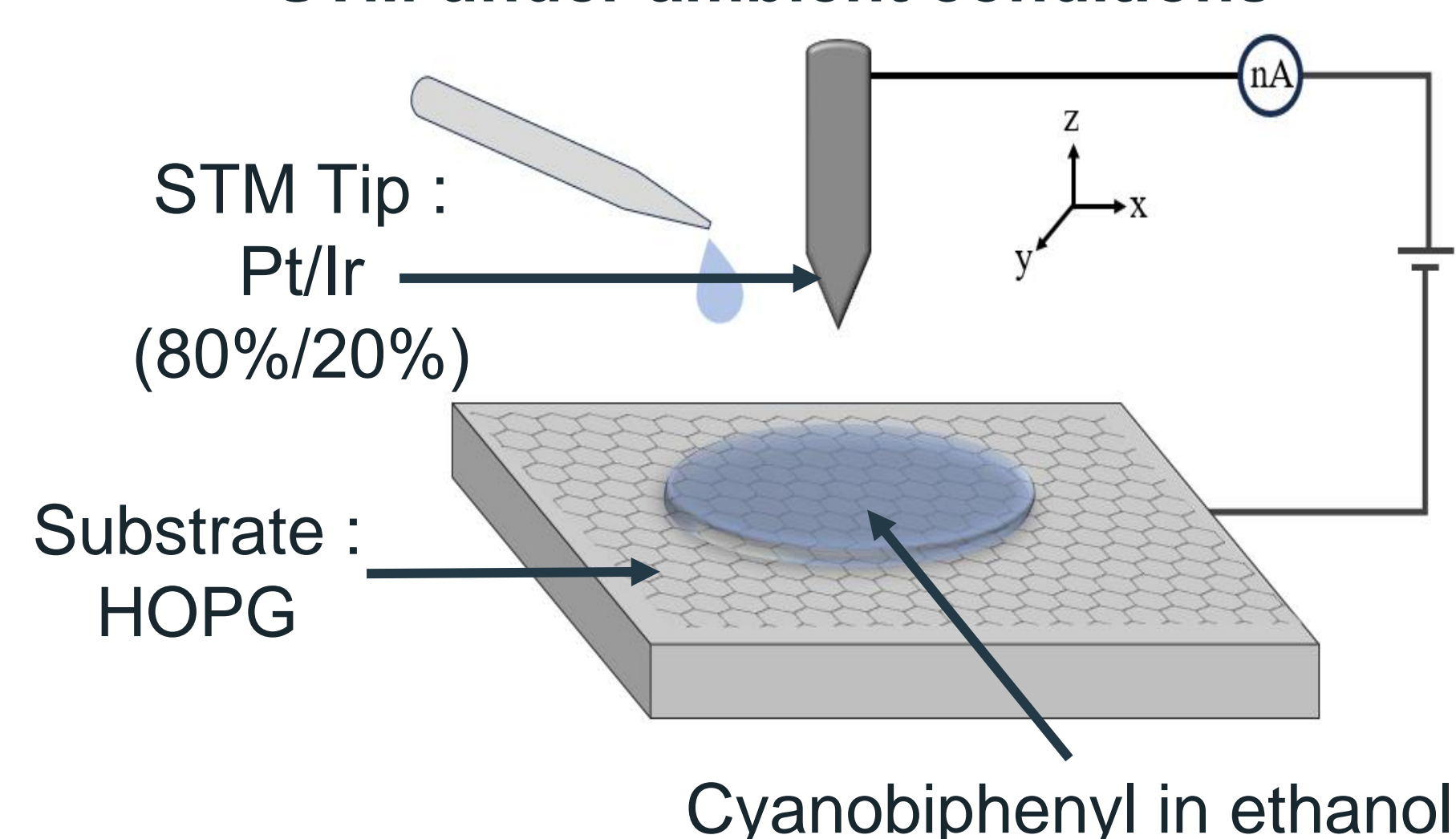
### Induction of Chirality in Two Dimensions

**Physical means** - e.g., application of magnetic field, geometric confinement.

**Chemical means** - e.g., majority rules, "sergeant-soldiers" principle, chiral auxiliary.

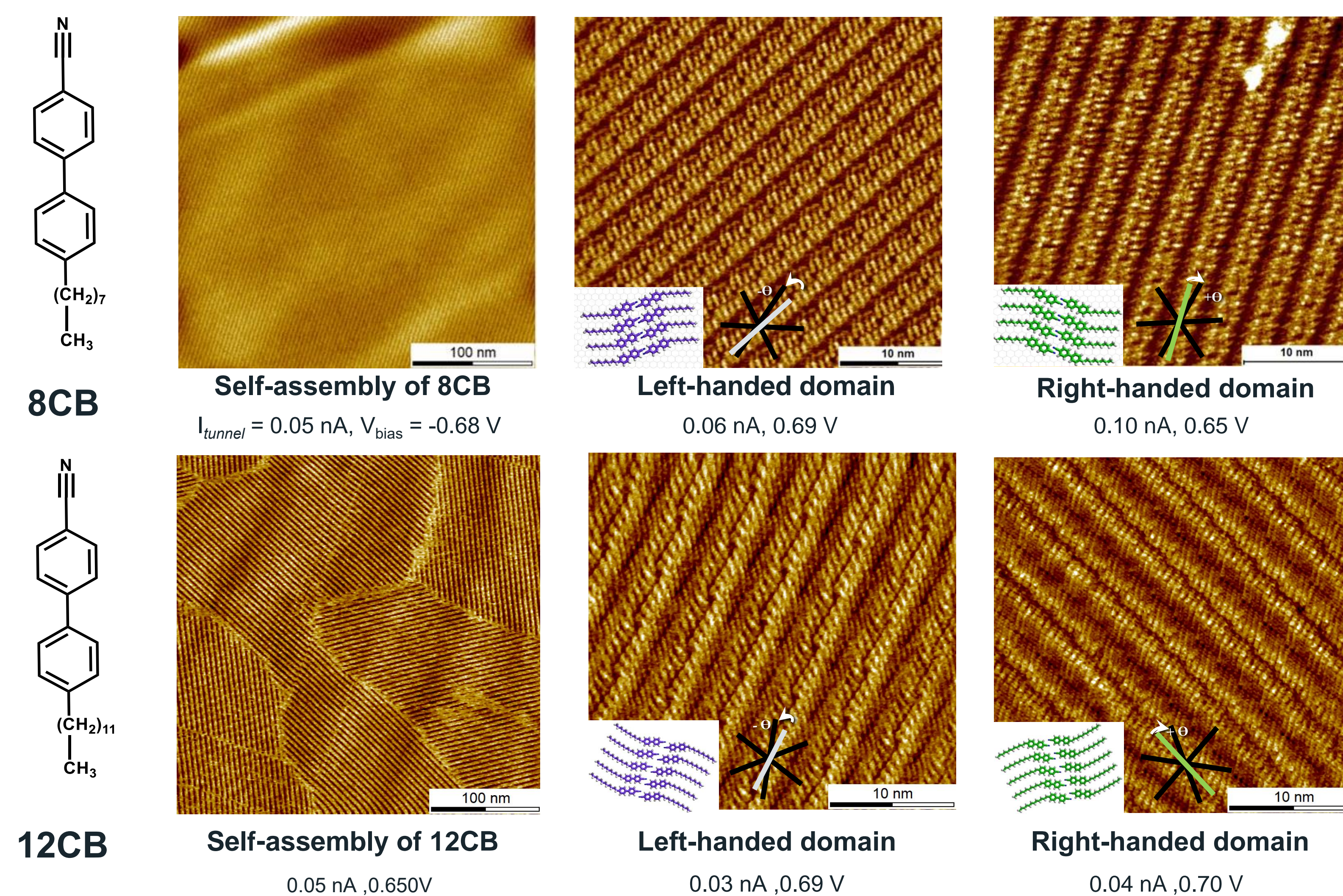
### Scanning tunneling microscopy (STM)

STM under ambient conditions

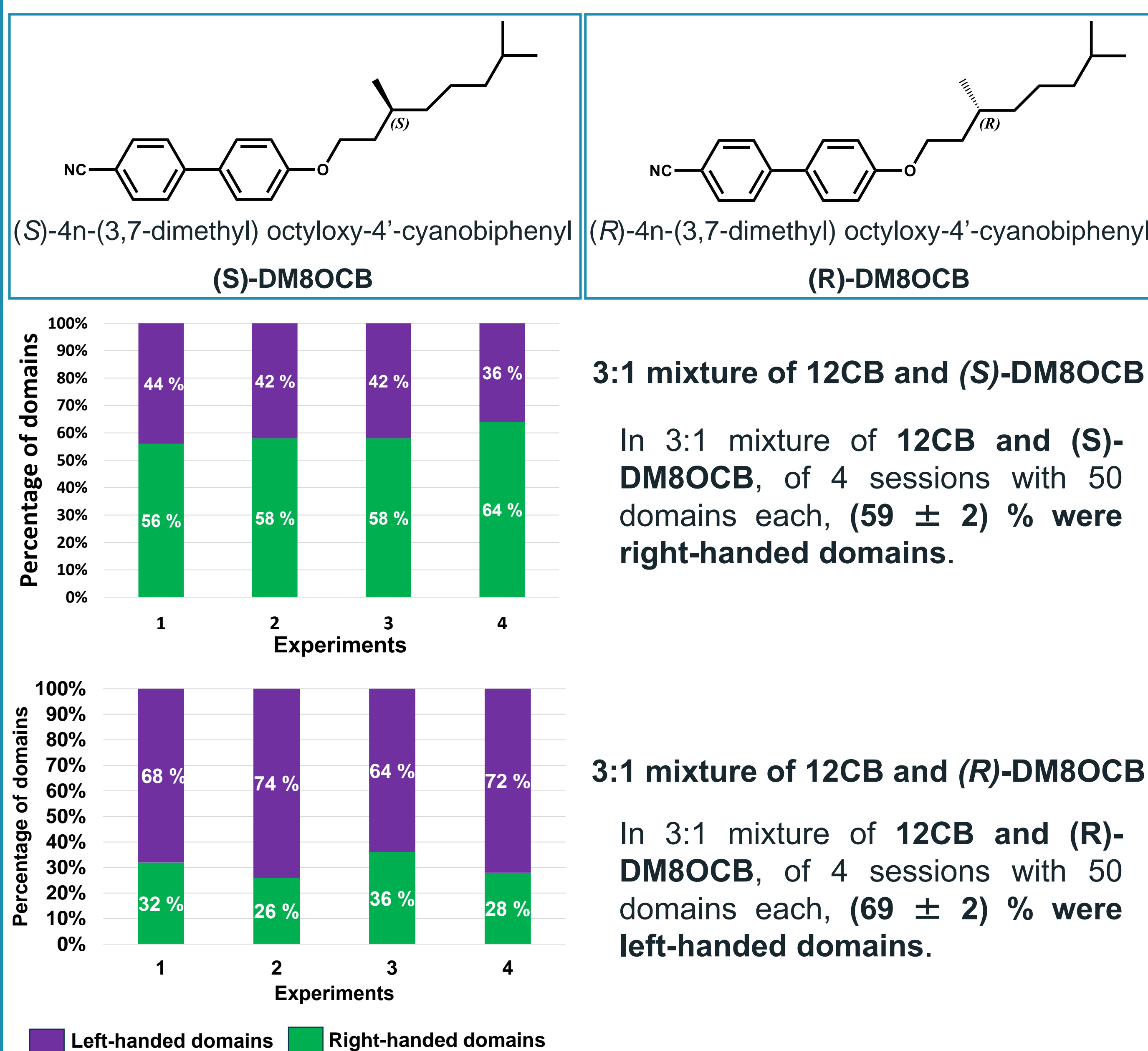


### Assembly of 8CB and 12CB

8CB and 12CB assemble in a similar fashion. However, 12CB forms smaller domains compared to 8CB. There is **equal surface coverage of left-handed domains and right-handed domains**.



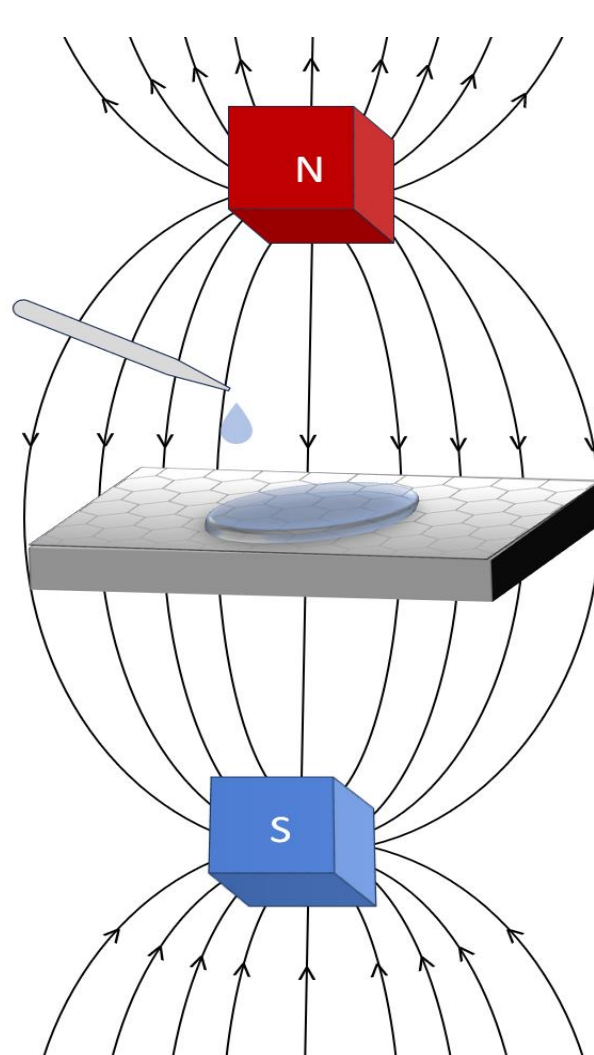
### Influence of chiral auxiliary on the assembly of 12CB



### Conclusion and Outlook

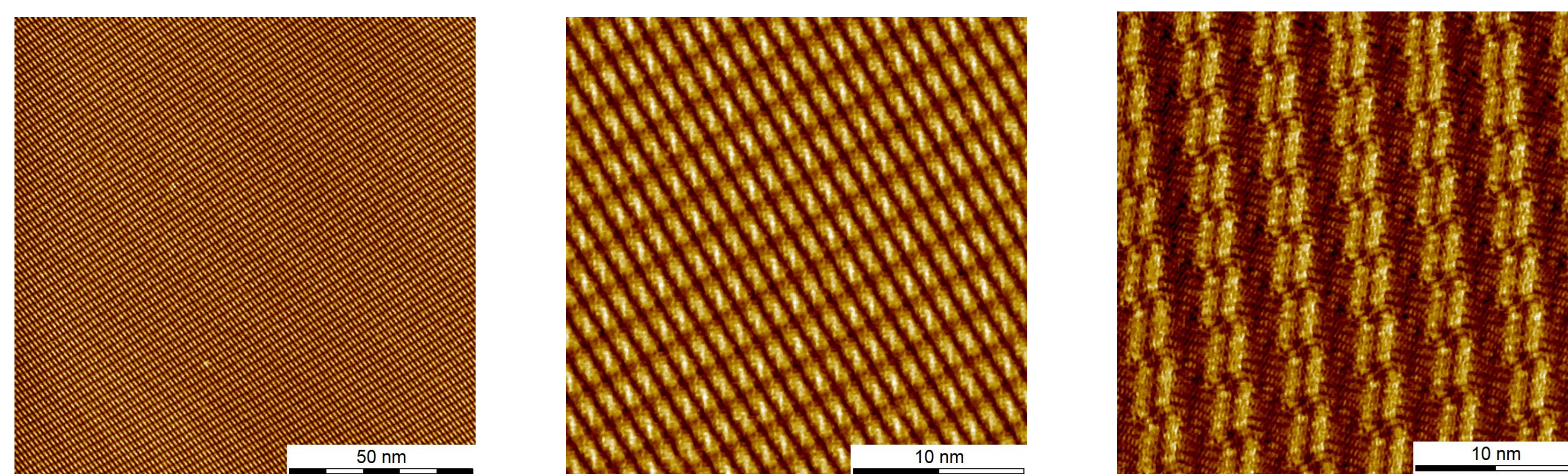
- 12CB** forms **smaller domains** compared to 8CB and they self assemble into **left- and right-handed domains in equal probability**.
- Addition of chiral auxiliaries, (R)-DM8OCB and (S)-DM8OCB, to 12CB influences the supramolecular chirality of the self-assembly of 12CB.**

What Next : Produce **net excess of one enantiomorph** over other using **magnetic field** and by changing the concentration of the auxiliary.



**Hot-deposition** of the mixtures did not increase the preference to a particular handedness.

**1:3 mixture of 12CB and (R)-DM8OCB**



Phase separation of 12CB and the chiral auxiliary was observed.

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