

Preparation of Chiral Surfaces from Achiral Liquid Crystals

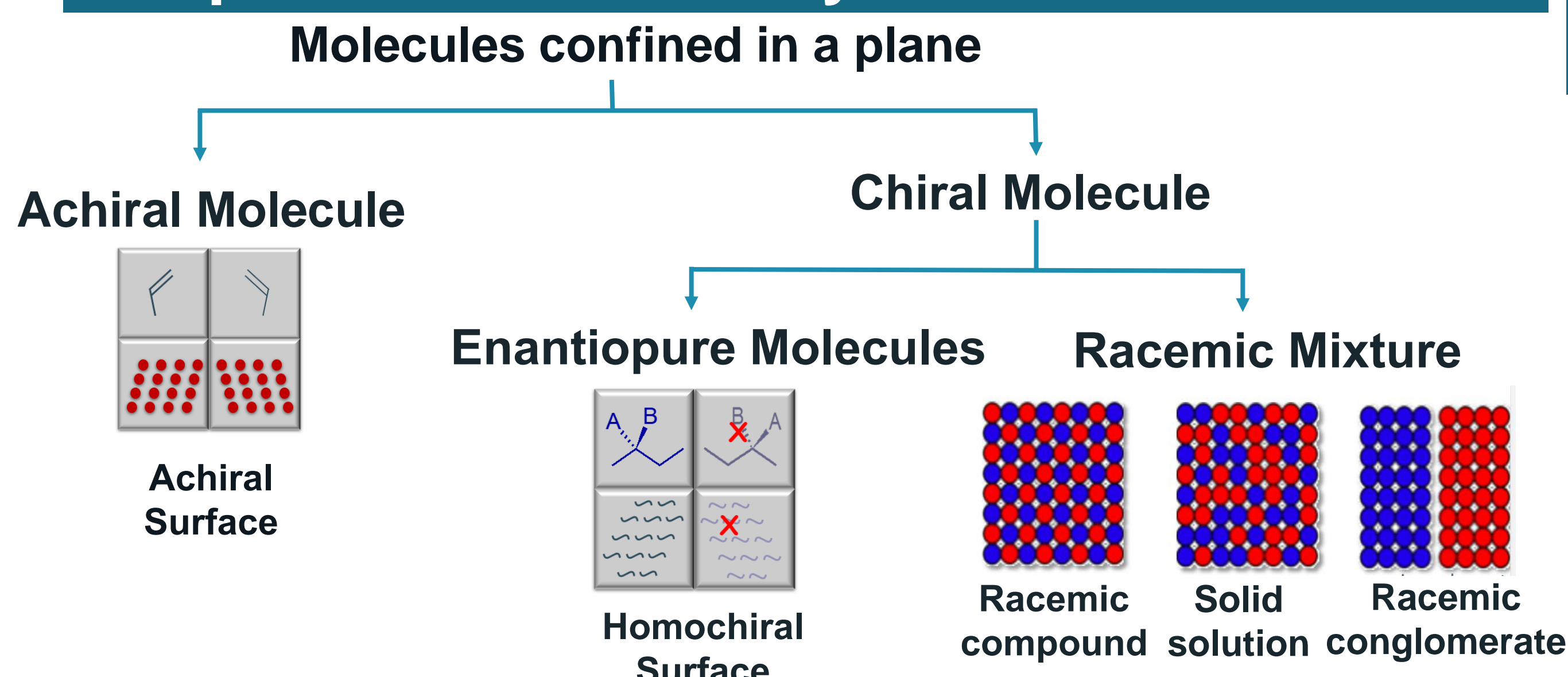
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Liquid crystals (LC) have been the subject of extensive research due to their unique characteristics and potential applications in various fields, including displays, sensors, and optical devices. The **cyanobiphenyl family**, which includes prochiral molecules like **4'-n-octyl-4-cyano-biphenyl (8CB)** and **4-cyano-4'-n-dodecylbiphenyl (12CB)**, has been widely investigated for their **assembly behaviour** on graphite and gold. They form **chiral surfaces** with **domains of opposite handedness**, with the overall surface remaining achiral due to the formation of equal areas of both handed domains. This study investigates the influence of chiral auxiliaries and magnetic fields on the handedness of the domains. The structure and handedness of the domains formed after the addition of the chiral auxiliary were analyzed using scanning tunneling microscopy (STM). Our findings show that the introduction of a chiral auxiliary can bias the chirality of the domains. This study helps to understand the possibilities for controlling molecular orientation and chirality in self-assembled molecular networks.

Expression of Chirality in Two Dimensions

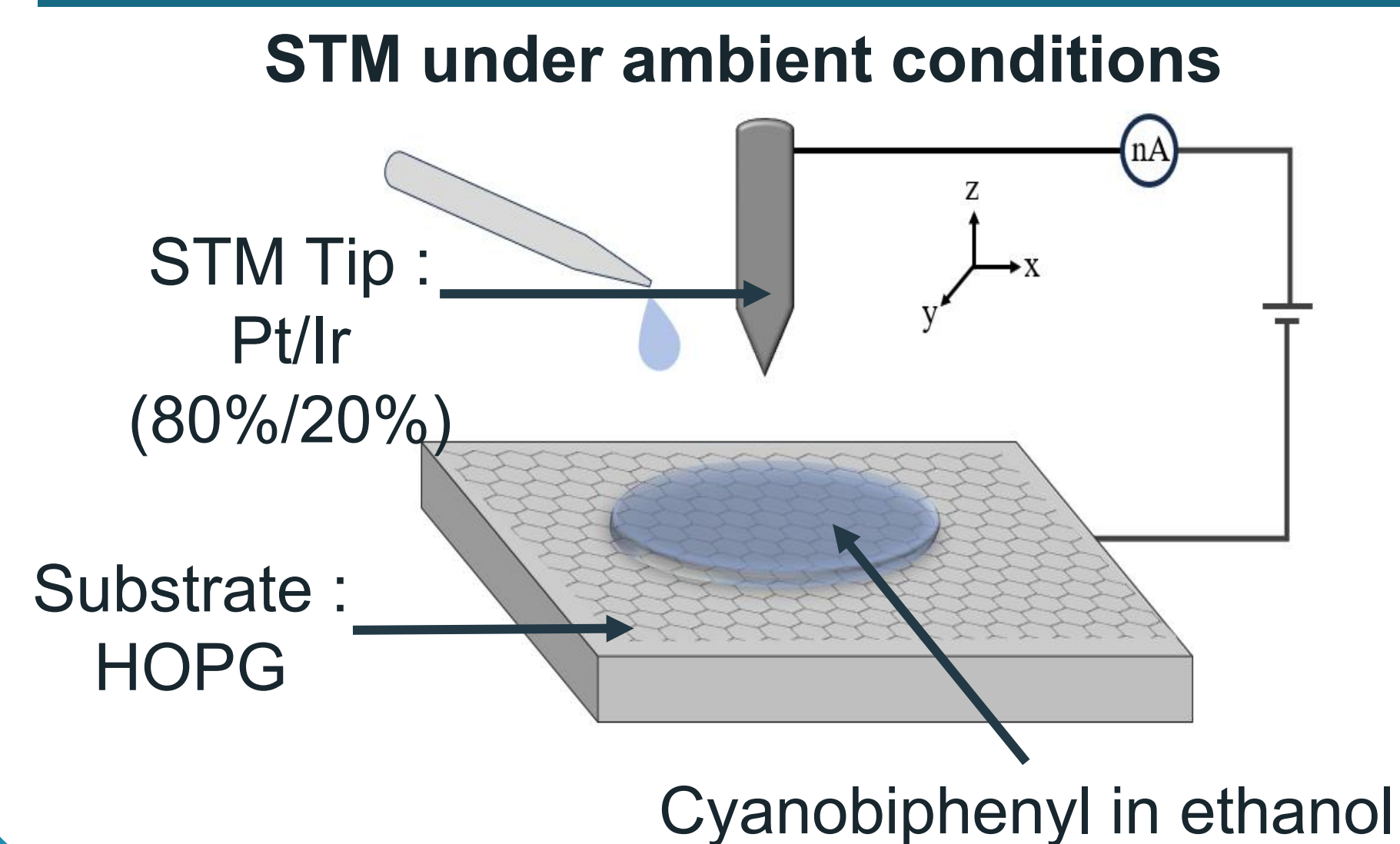


Induction of Chirality in Two Dimensions

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

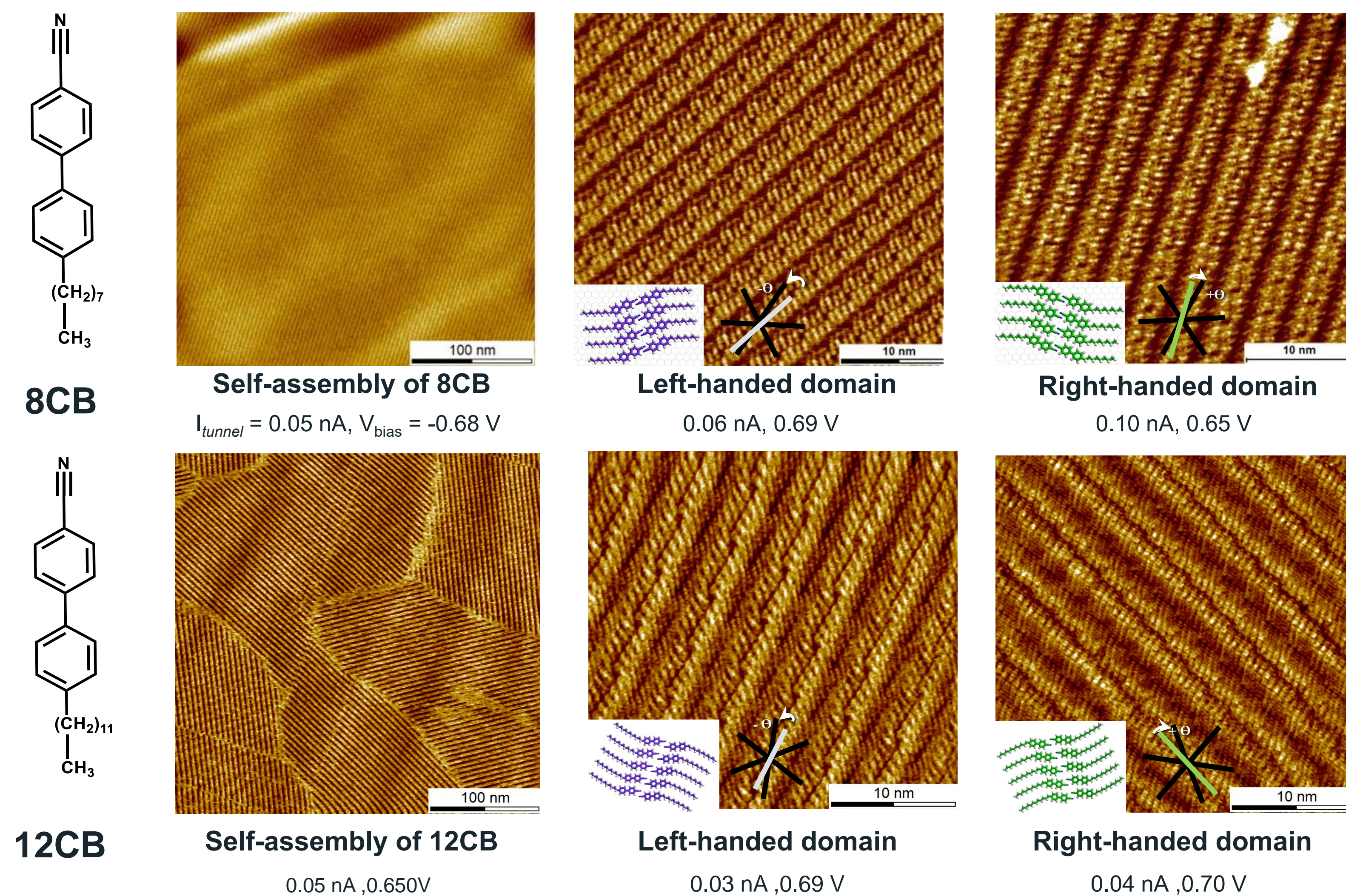
Chemical means - e.g., majority rules, "sergeant-soldiers" principle, chiral auxiliary.

Scanning tunneling microscopy (STM)

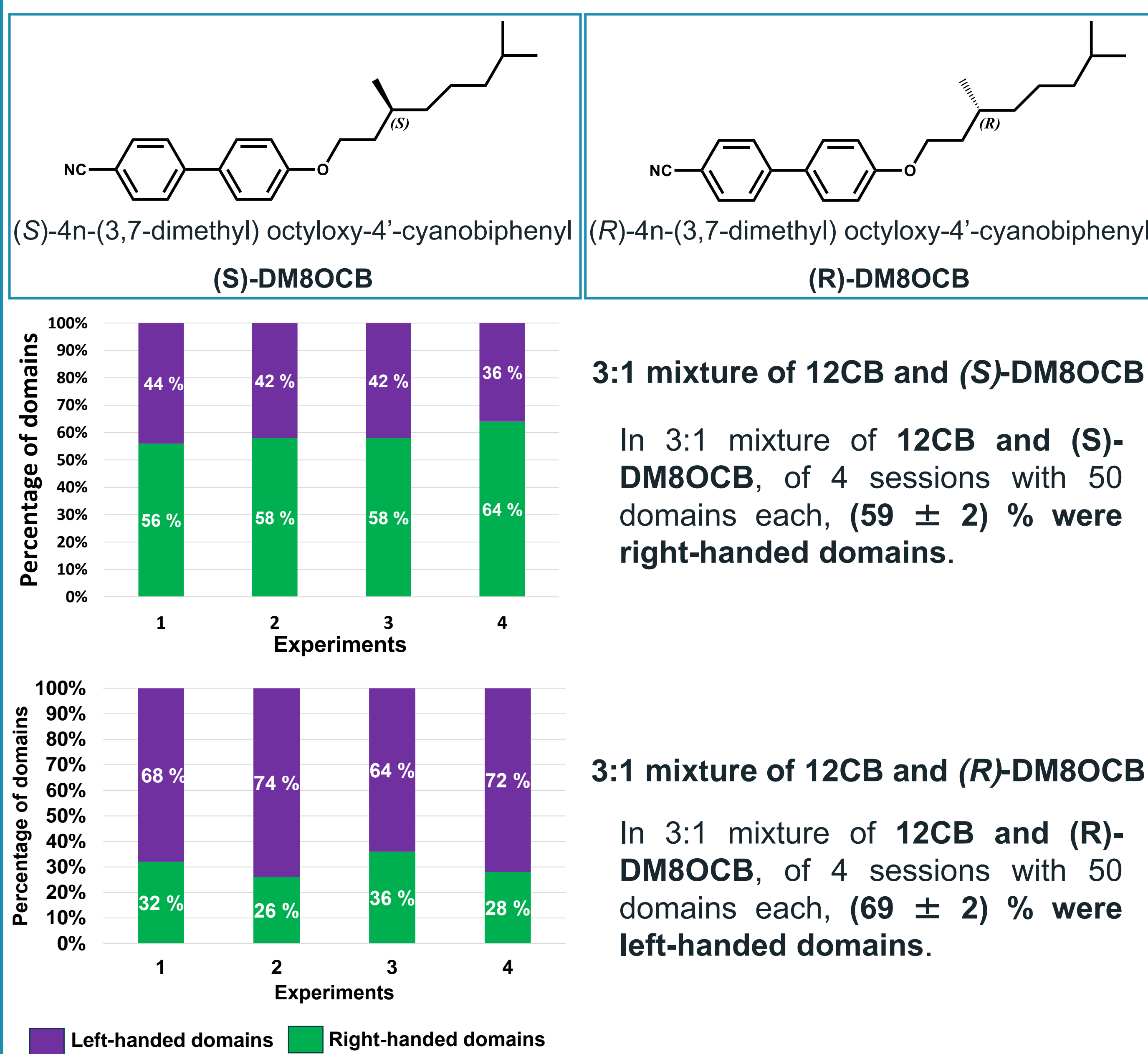


Assembly of 8CB and 12CB

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**.



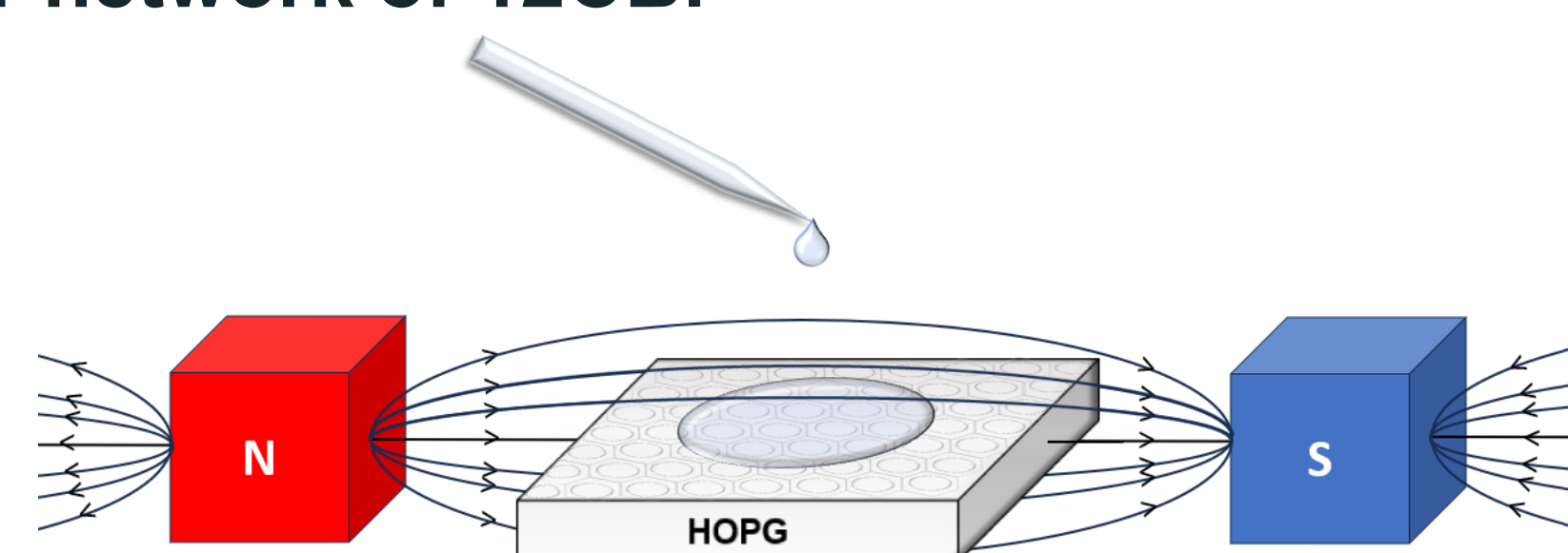
Influence of chiral auxiliary on the assembly of 12CB



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** to 12CB influences the **supramolecular chirality** of self-assembled molecular network of 12CB.

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



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