

Multilayered Carbon Nanomaterials from Self-Assembled Reactive Molecular Precursors

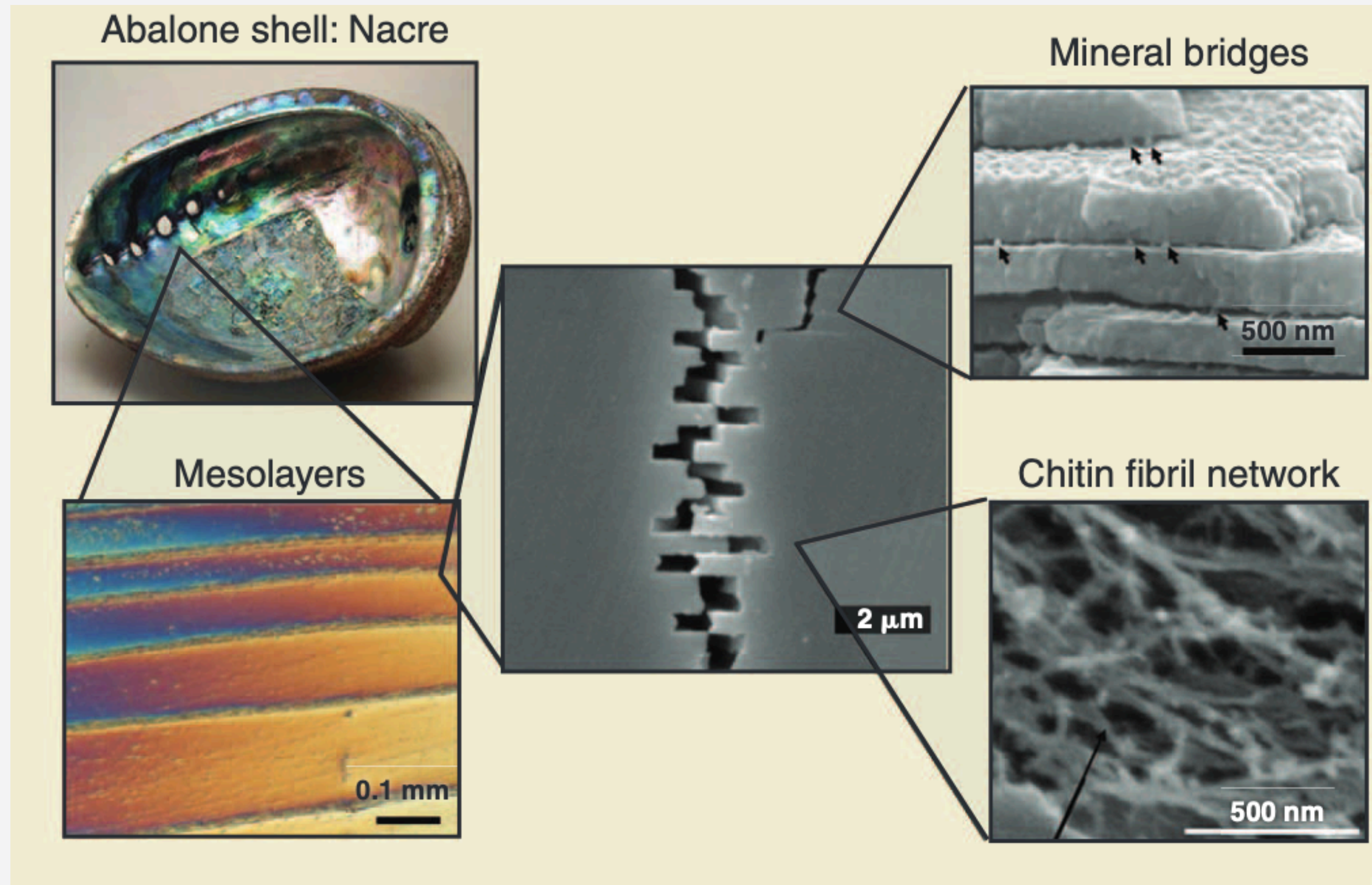
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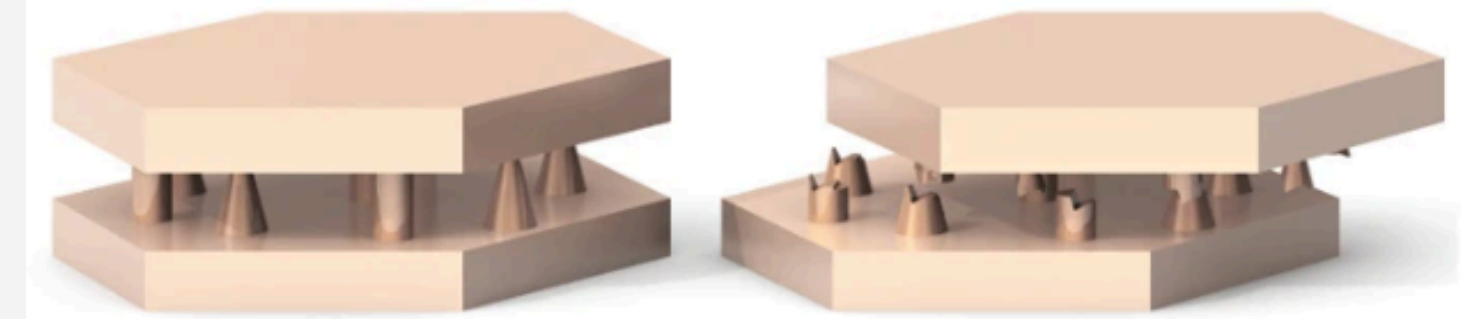
Institute of Materials (IMX)
Laboratory of Macromolecular and Organic Materials (LMOM)

Multilayered Structures in Biological Materials

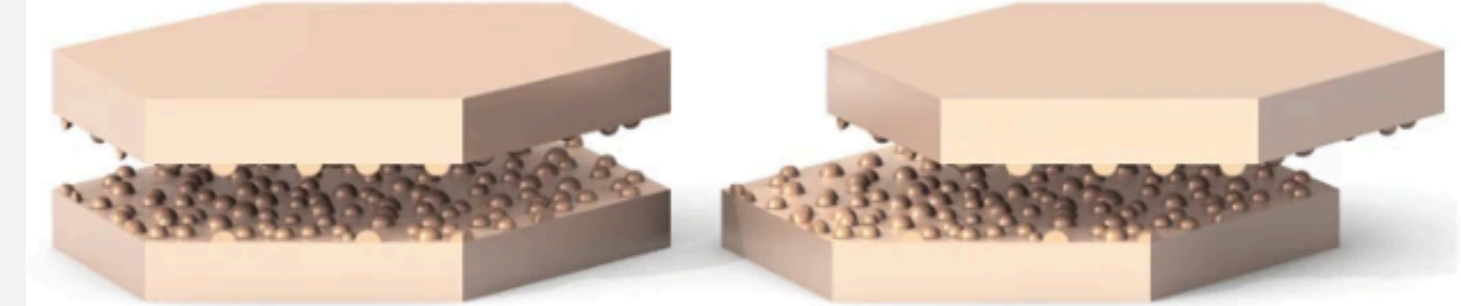
natural nacre (brick-and-mortar architecture)



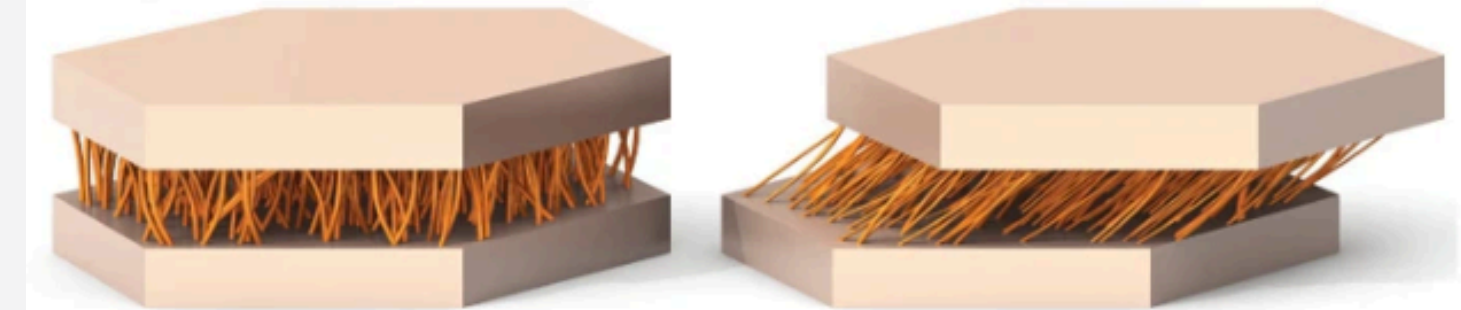
Breaking of mineral bridges



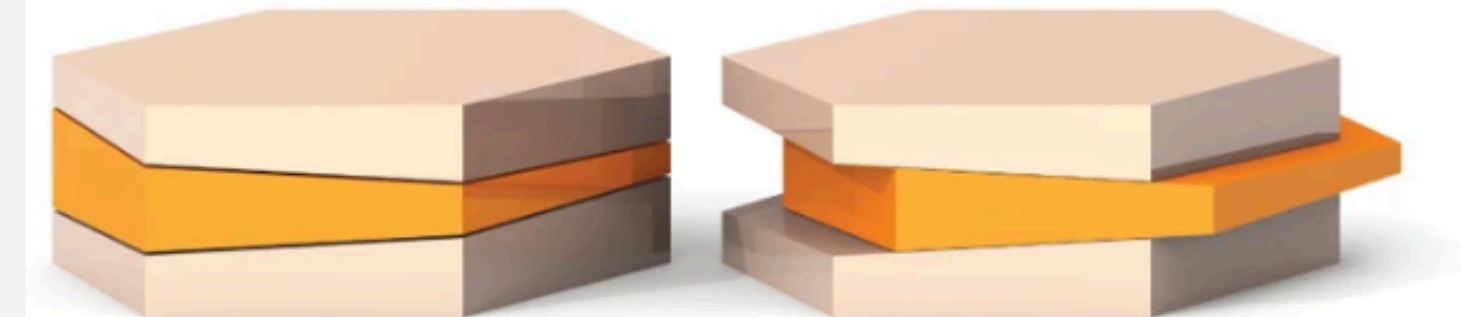
Inelastic shearing resisted by nano-asperities



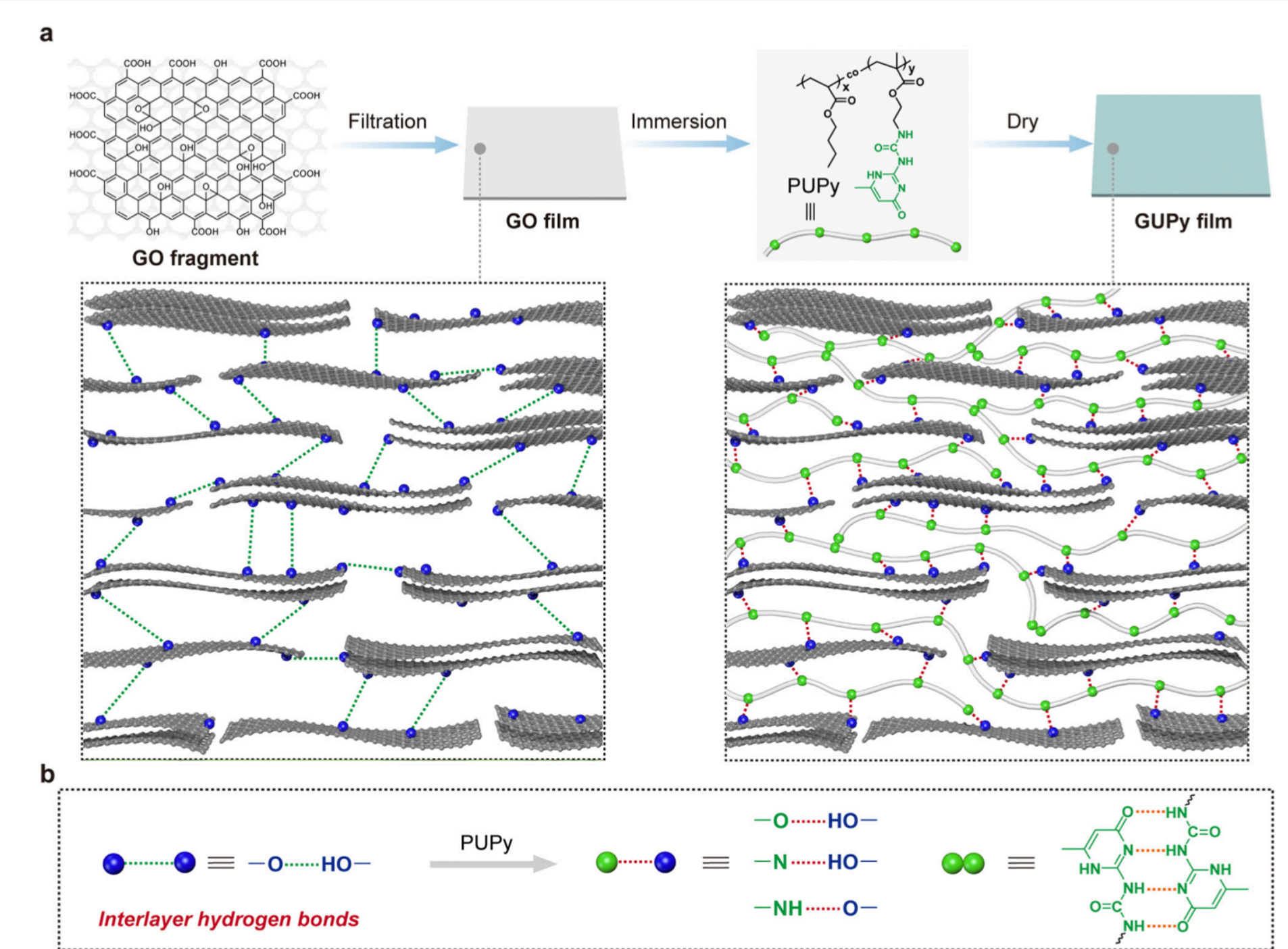
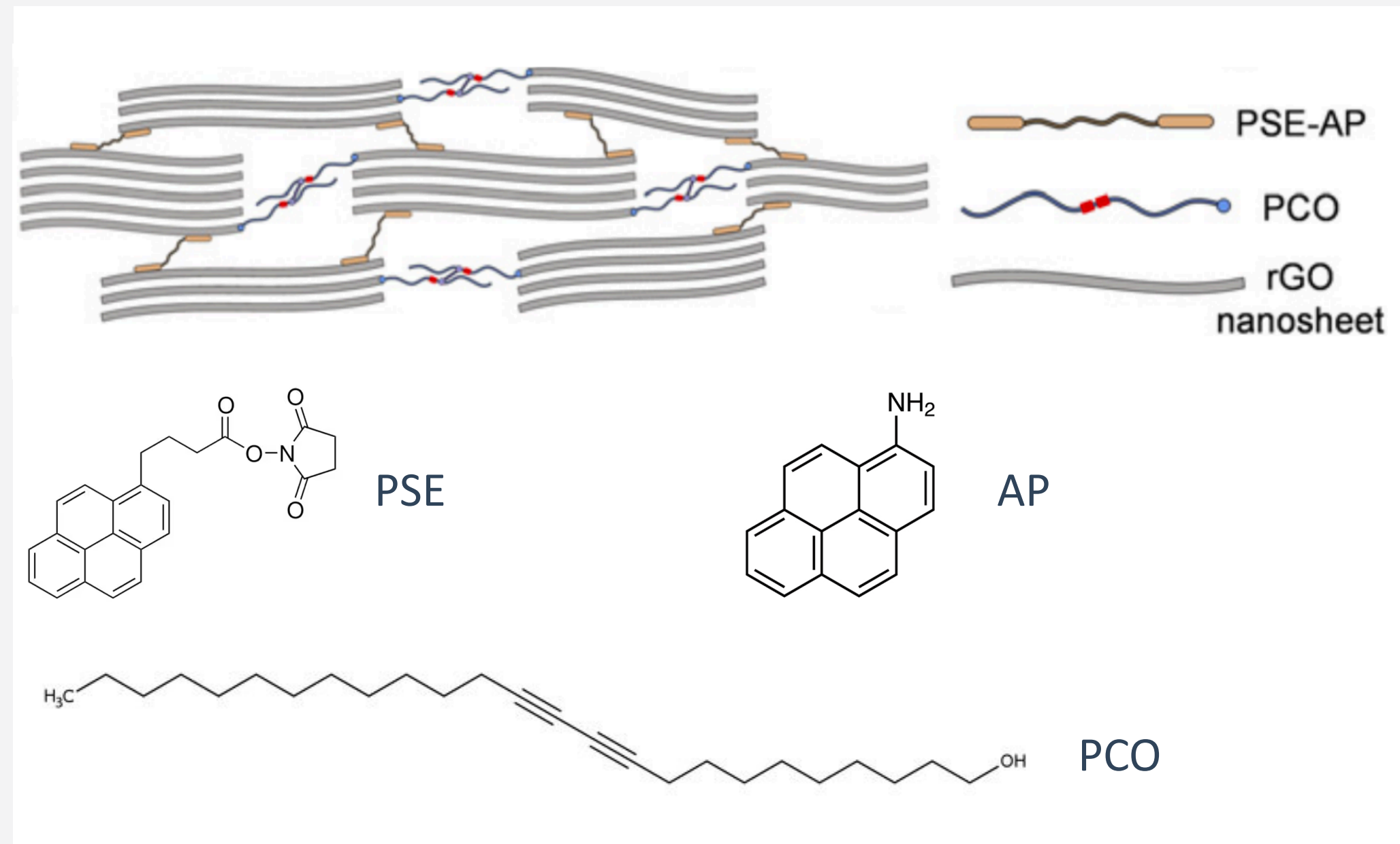
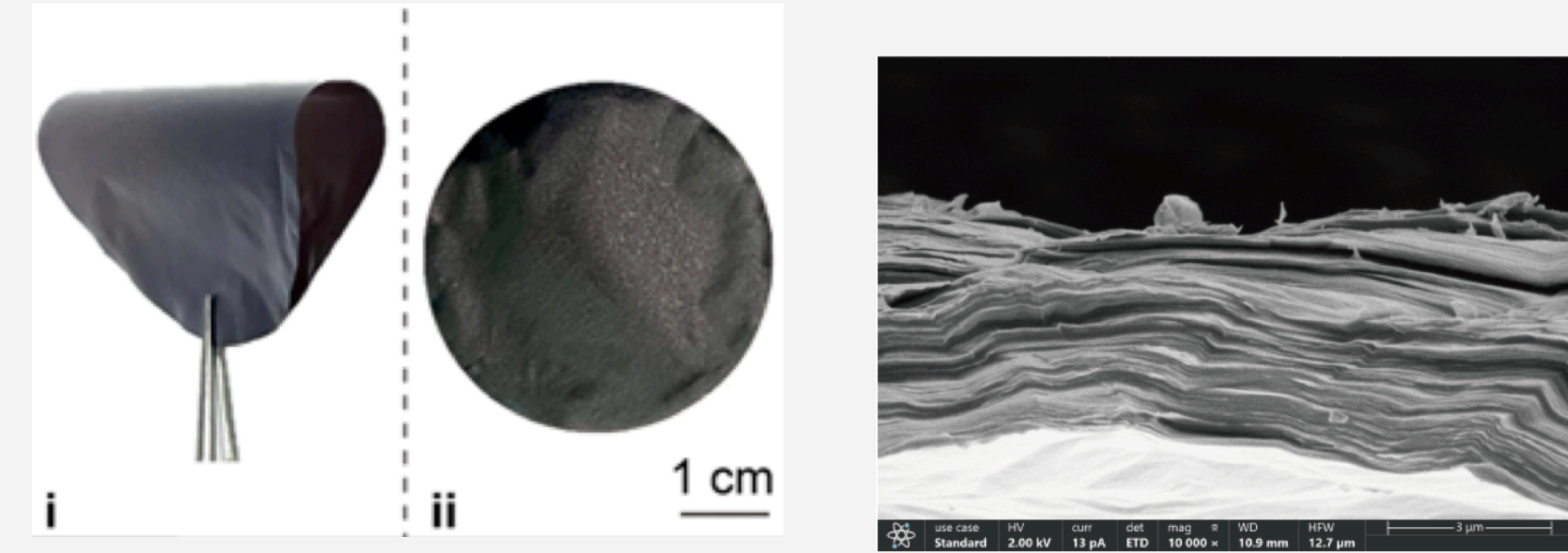
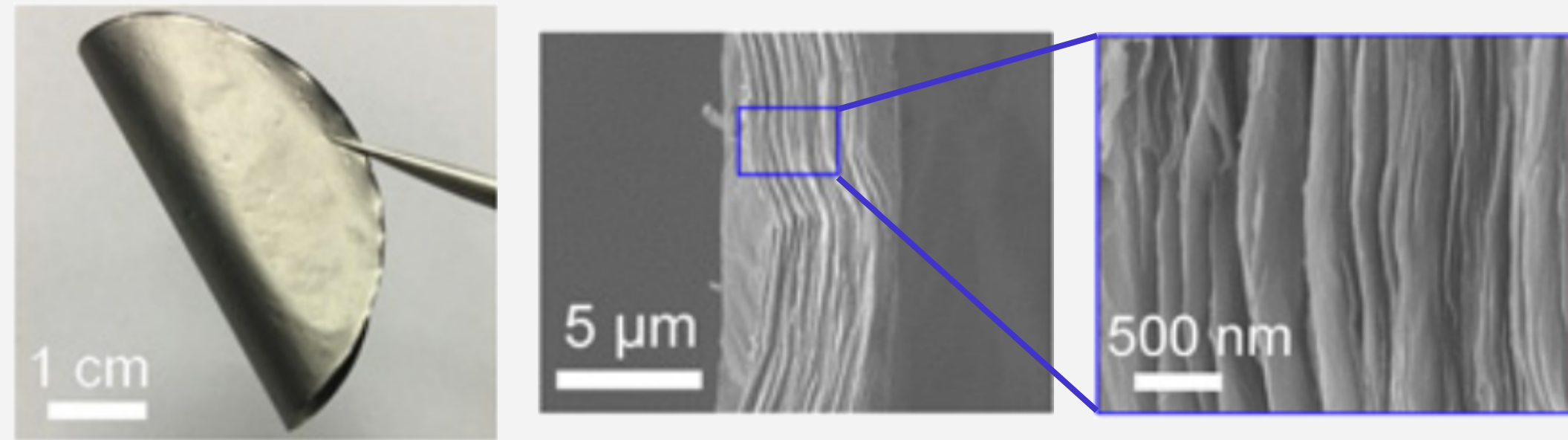
Organic layer acting as viscoelastic glue



Tablet interlocking during sliding

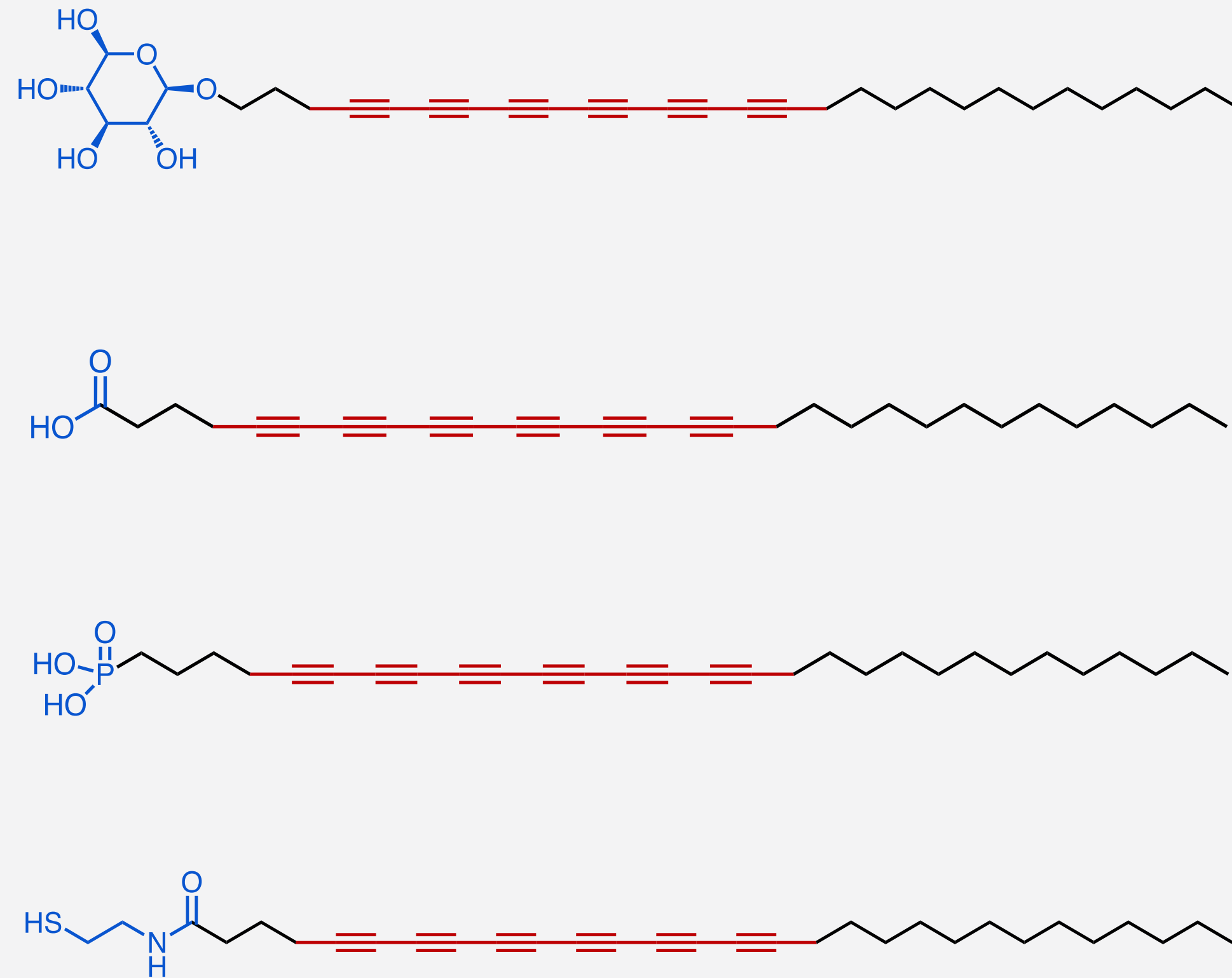


Top-Down Approach Multilayered Carbon Nanomaterials

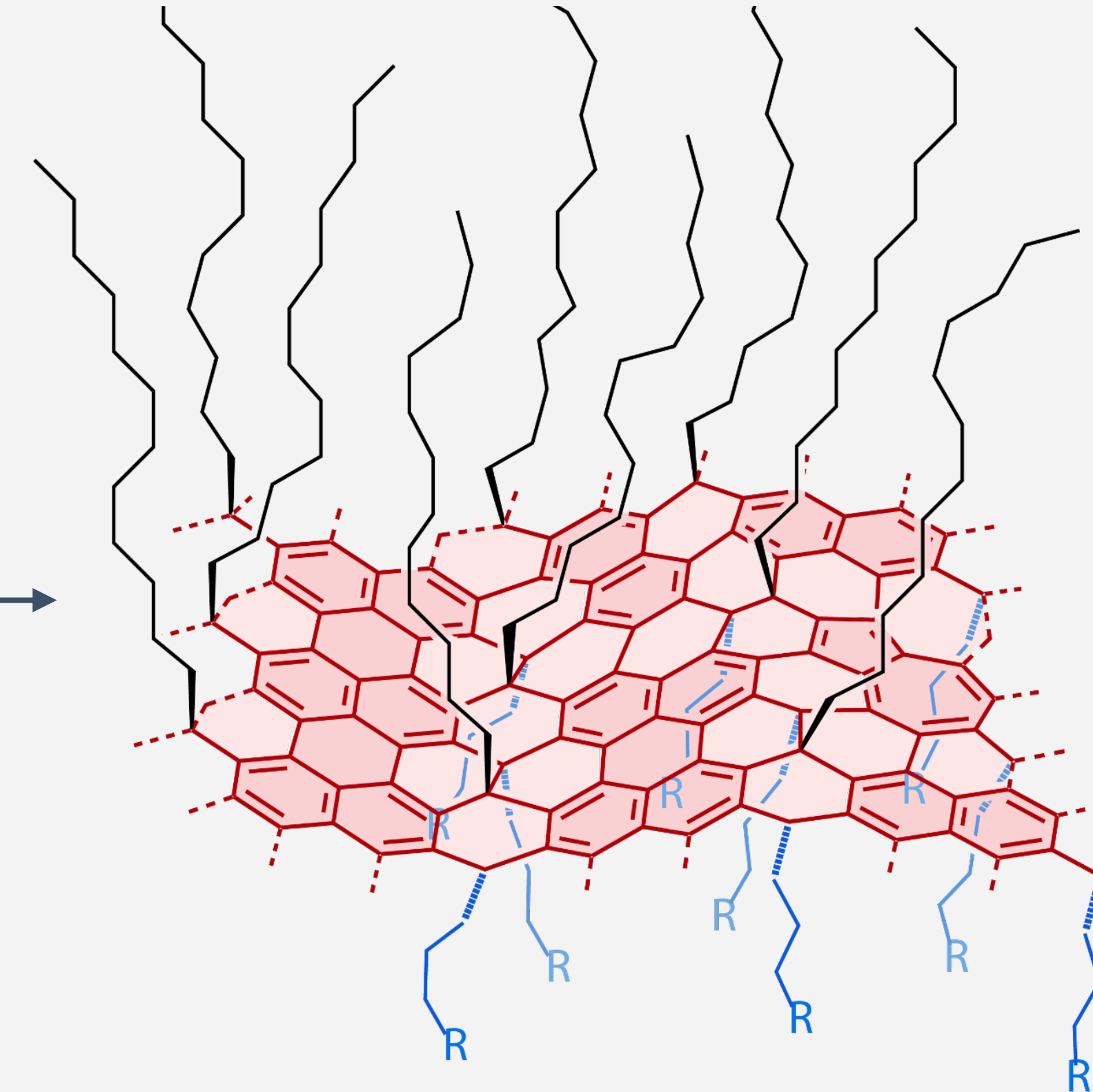


- mainly GO-based composites (strength and toughness)

Bottom-up Synthesis of Carbon Nanomaterials



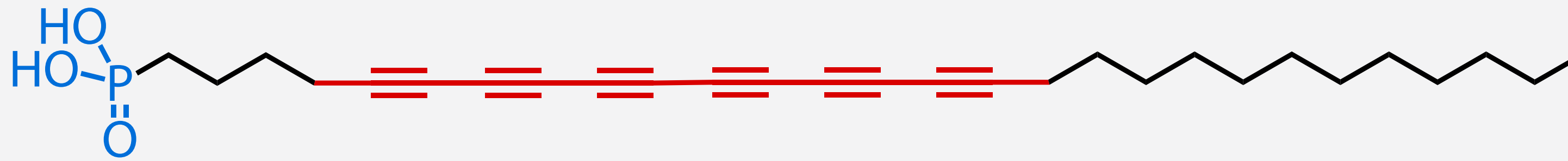
UV →



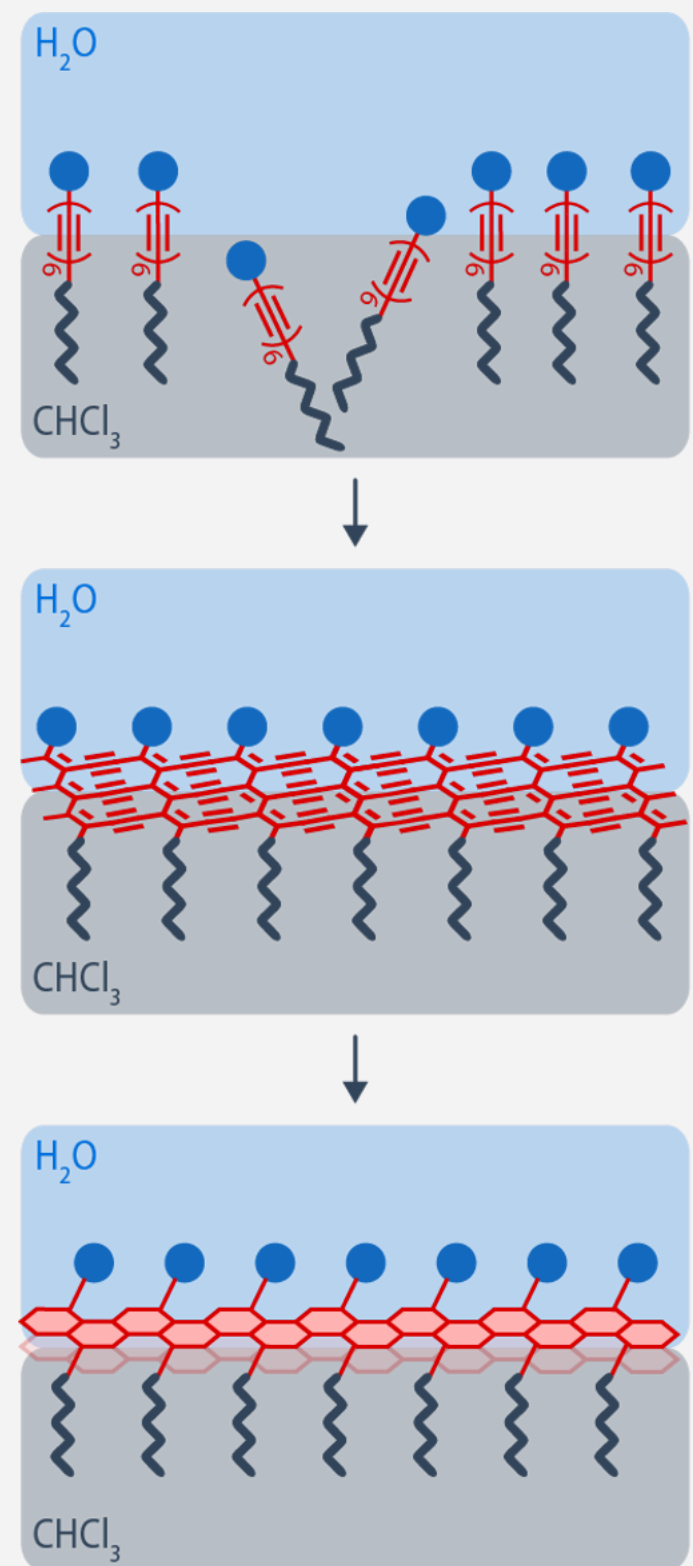
- surfactants for supramolecular self-assembly
- hexaynes as reactive carbon-rich precursors

- sp^2 -rich amorphous carbon monolayer
- tailored functional group

Research Background



liquid-liquid interface assembly

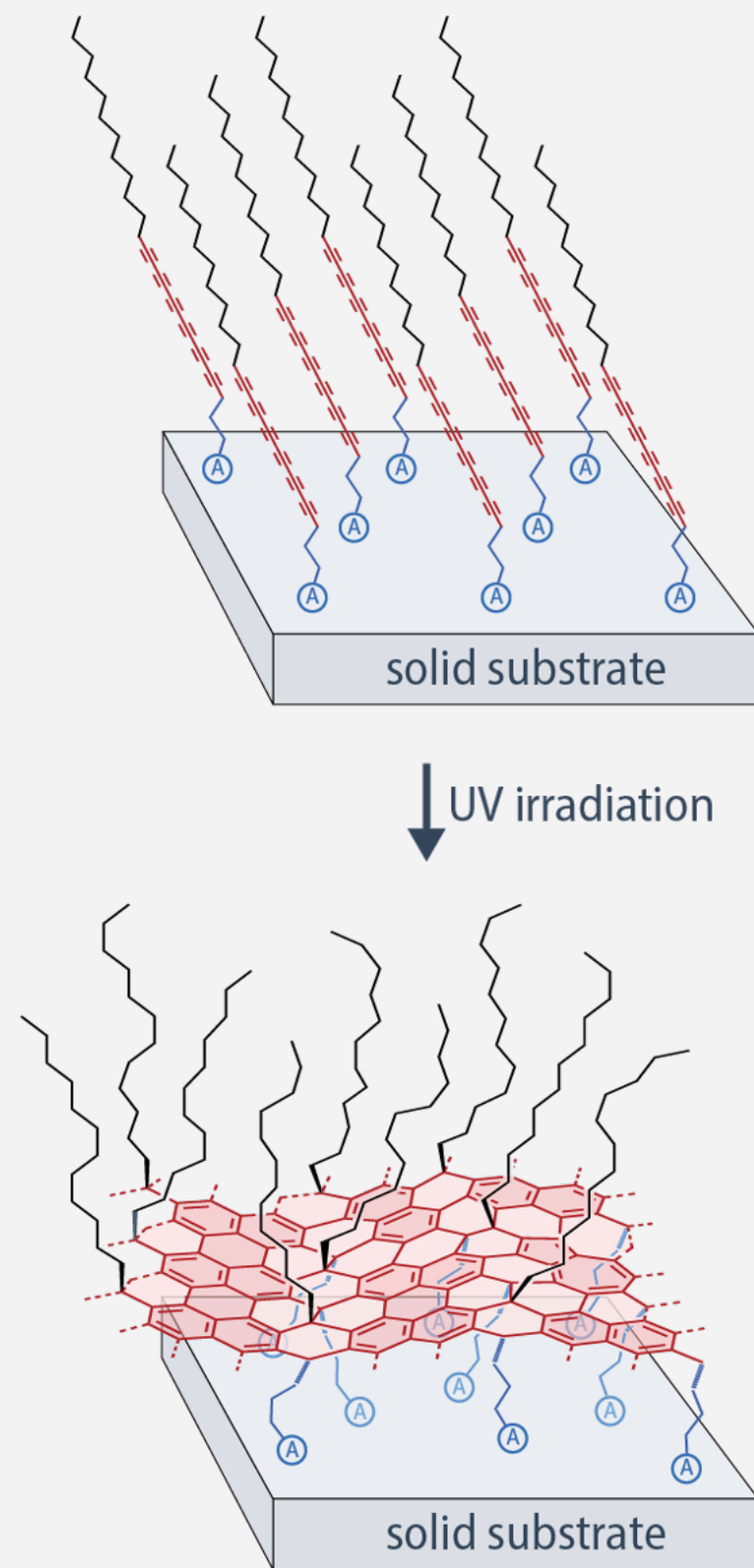


interfacial self-assembly

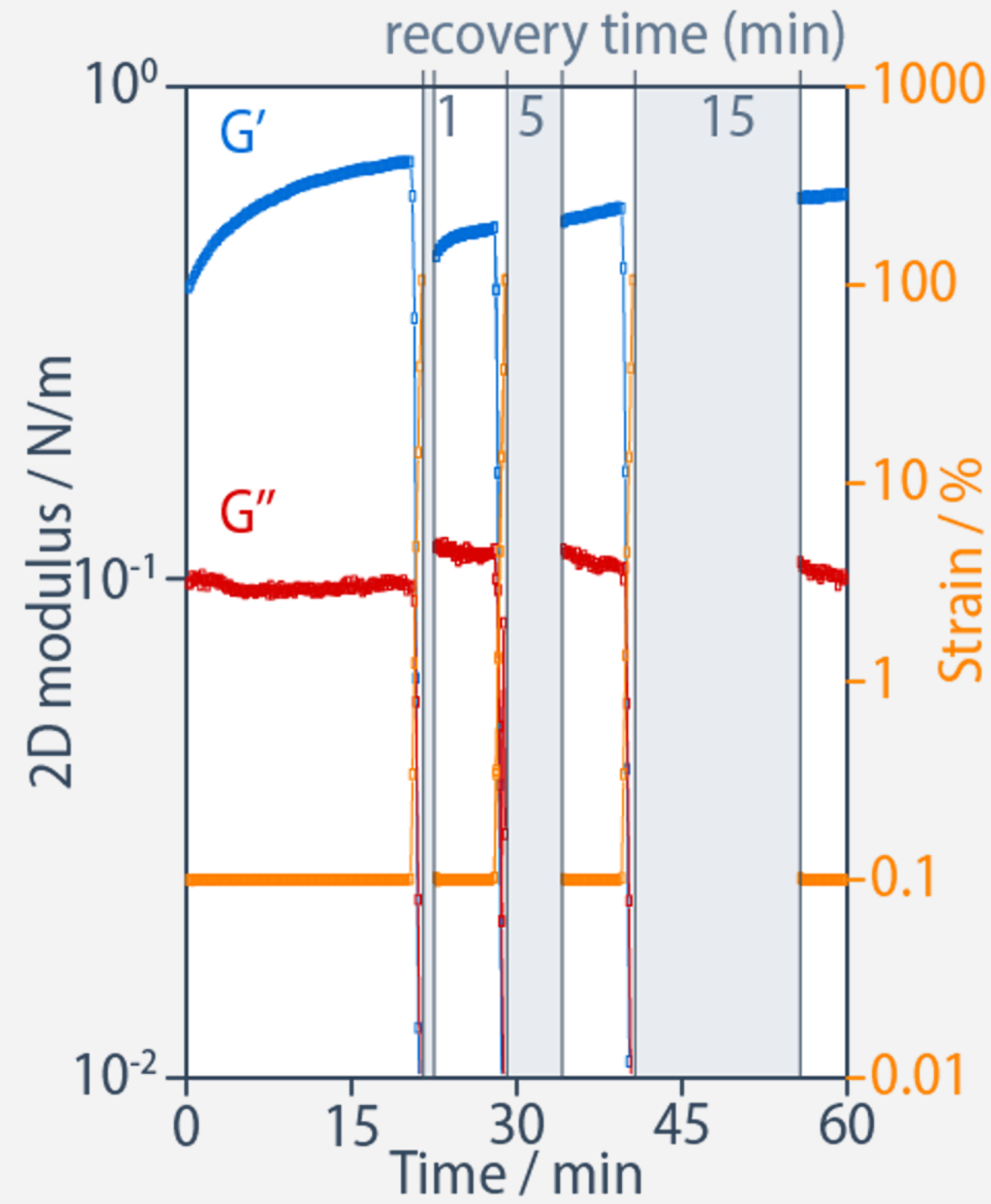
spontaneous crosslinking

carbonization

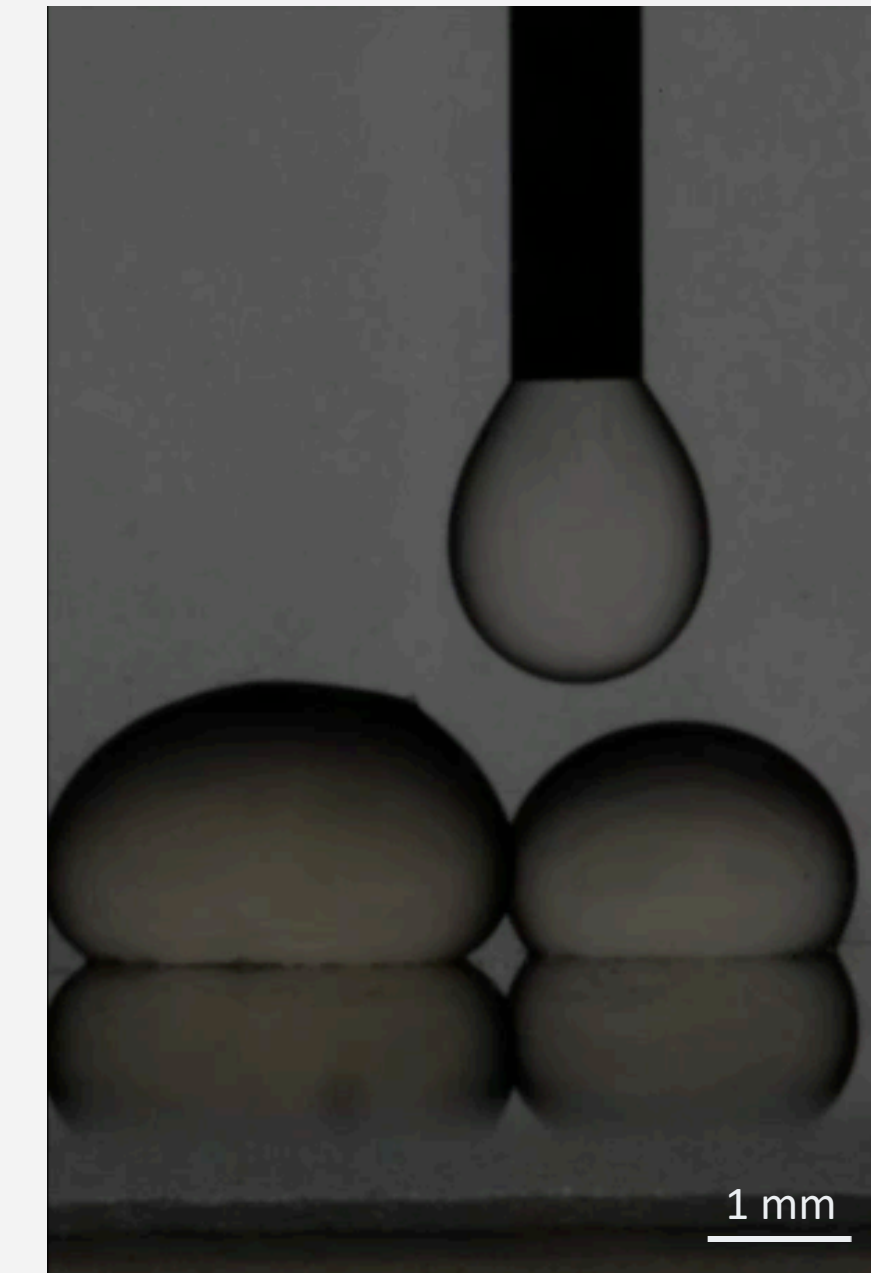
surface self-assembly



interfacial rheology



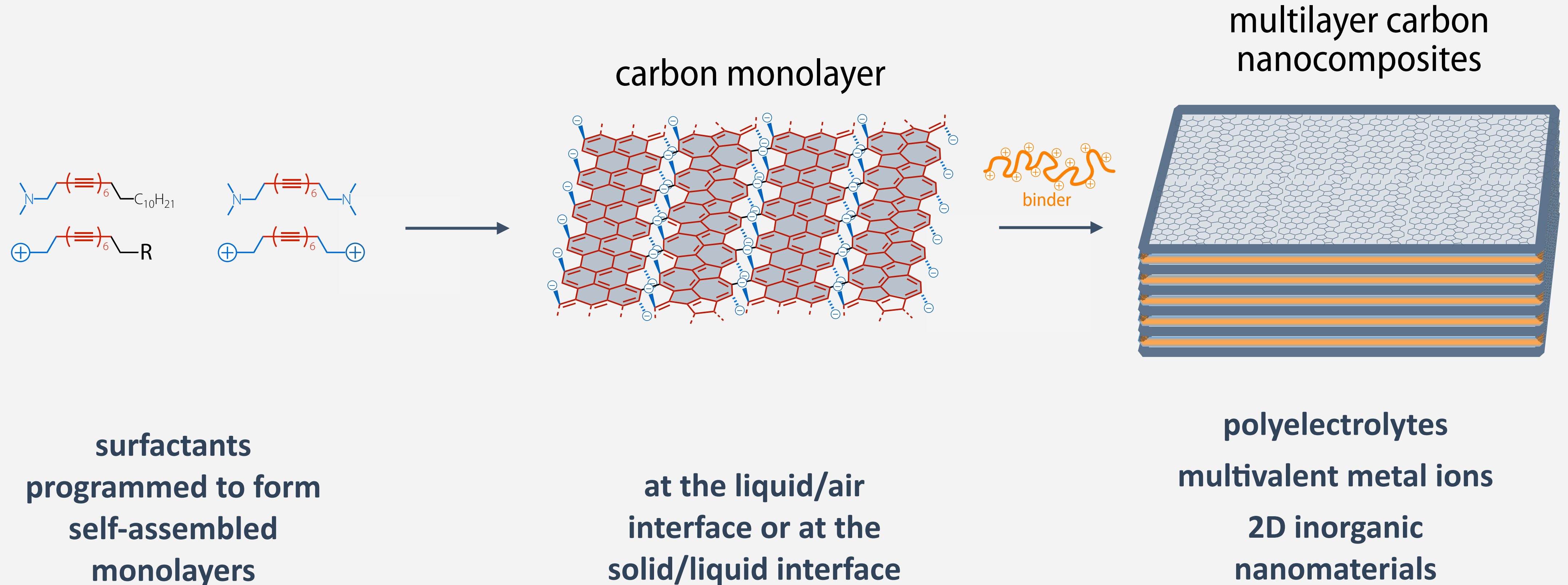
reconfigurability



- introduction of “self-healing” and reconfigurability properties in a carbon nanomaterial

Future Research Directions on Multilayers

- using hexayne bolaamphiphiles to form self-assembled carbon monolayers



- goal: obtain multilayered carbon nanocomposites with controlled chemical functionalization and hierarchical structure

Thank you for your attention