

Self-Assembly in nature

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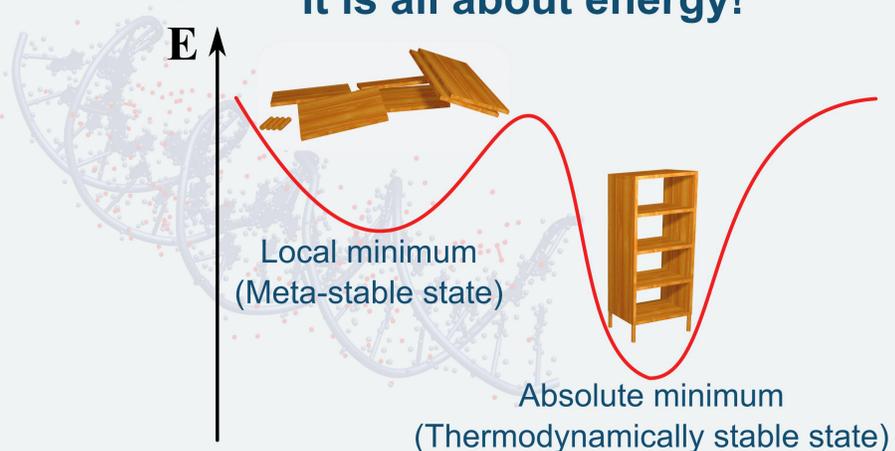
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What is self-assembly

Can you imagine a furniture spontaneously assembling itself?

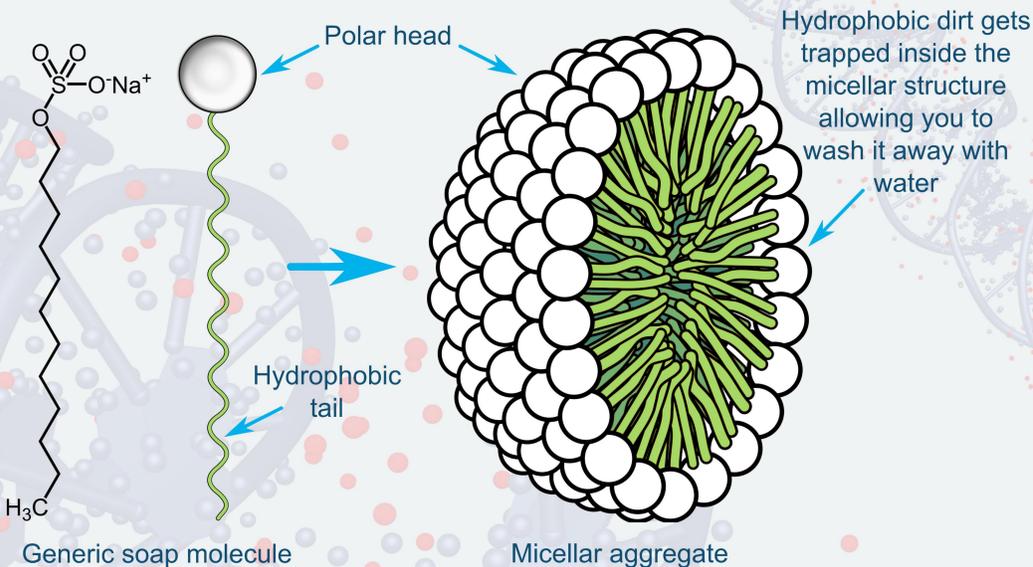


It is all about energy!

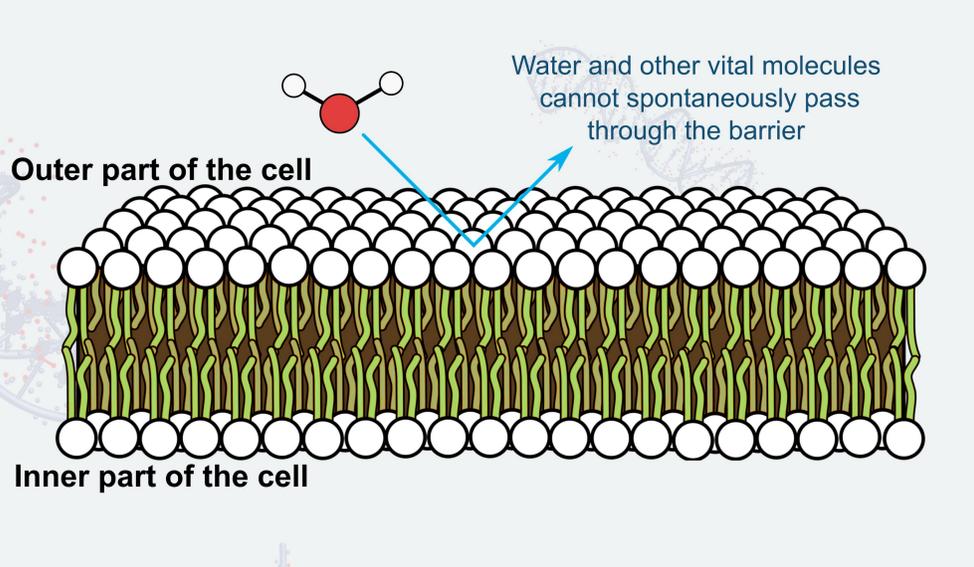


At molecular scales it happens all the time!

For example, every time you wash your hands the molecules of soap in water spontaneously self-assemble into ordered structures called micellae

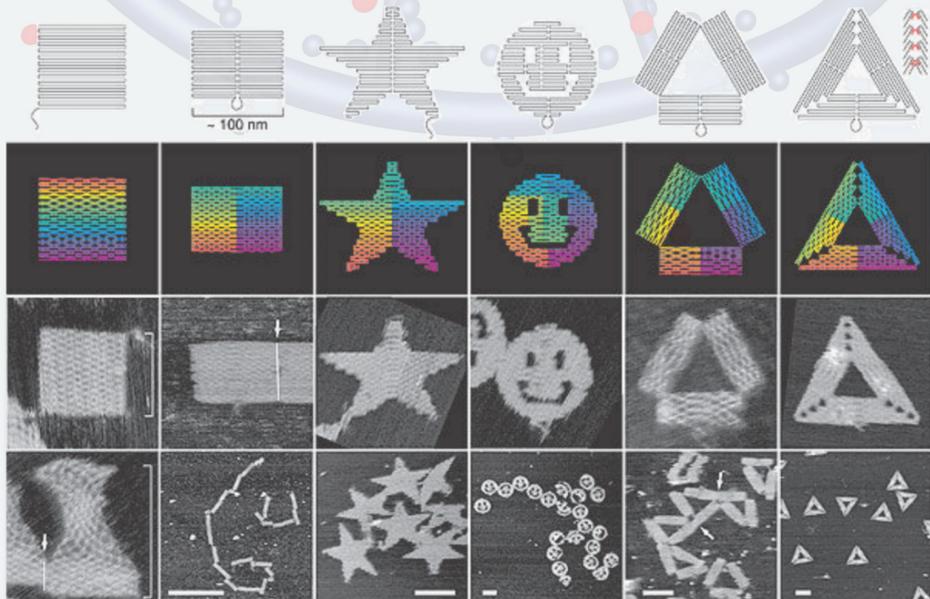


Every cell of your body is covered by a phospholipid by-layer membrane which protect the cell and its content from the environment



How can we exploit self-assembly?

Since the final structure is always the most thermodynamically stable, molecules can be engineered to self-assemble into complicated and highly controlled geometries with sub-nanometer precision



Bottom-up fabrication of self-assembled functional polymers for opto-electronic devices such as:

- Solar cells
- Field-effect transistors
- Sensors

| Monomer | Supramolecular polymer |
|---------|------------------------|
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Rothemund, P. W. K. Folding DNA to create nanoscale shapes and patterns. Nature 440, 297-302, (2006).

Aida, T., Meijer, E. W. & Stupp, S. I. Functional Supramolecular Polymers. Science 335, 813-817, (2012).