



Seminar

“IRTG: Soft Matter Science “

Chirality as a special structure-forming factor: its role in self-assembly

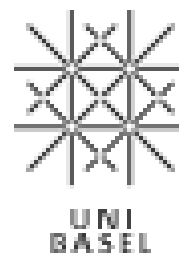
Irina A. Nyrkova

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Wednesday, November 17th, 14h15

“Hörsaal Makromolekulare Chemie”,
Stefan-Meier-Str. 31, Freiburg

You are welcome to meet Irina A. Nyrkova after the seminar. Do not hesitate to contact Christelle Vergnat (softmattergraduate@physik.uni-freiburg.de) to organize a meeting.



Chirality as a special structure-forming factor: its role in self-assembly

Chirality is one of the most powerful factors (together with amphiphilicity, shape asymmetry, Coloumb interactions and external restrictive symmetry-breaking) controlling structuring in various polymeric and self-assembling systems. Although not fully appreciated yet by scientific community, chirality plays a major role in formation of hierarchical filament structures (Fig.1), in specific gel formation (Fig.2), in controlling of lipid bilayers (Fig.3) and other lamellar shapes (Fig.4); chirality can be used as an effective structure-trigger (like in the DNA collapse governed by handedness-recognition of counter-ions, Fig.5) and for peculiar kinetic guiding. Chirality is widely exploited in living world and it can be a source of diverse benefits (& dangers) when dealing with biological objects.

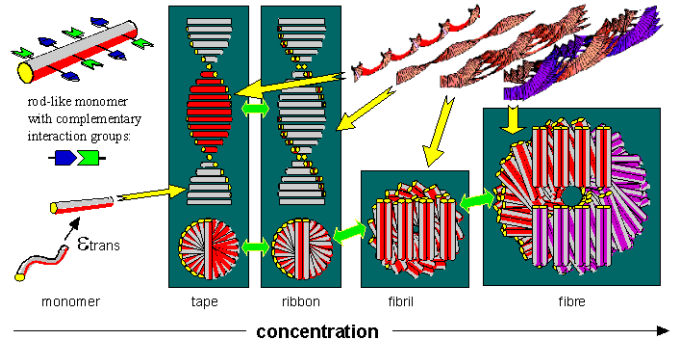


Fig.1. The hierarchy of self-assembling structures in solutions of oligomeric rod-like peptides.

In my lecture I discuss theoretical approach for handling chiral systems and the major outcomes (equilibrium, kinetic and dynamical) expected from the presence of handedness. Many examples of diverse footprint marks of chirality will be considered.

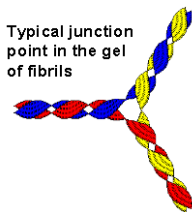


Fig.2. Chiral gel.

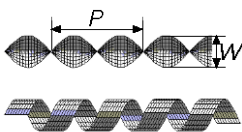


Fig.3. Chiral bilayer shapes.

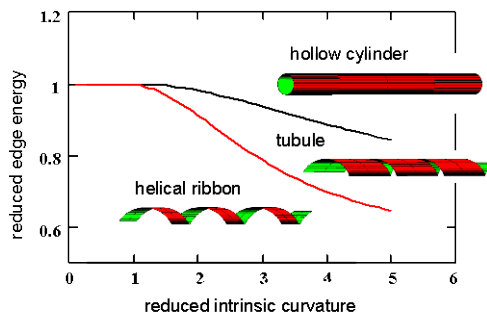


Fig.4. Structures in organogelator solution

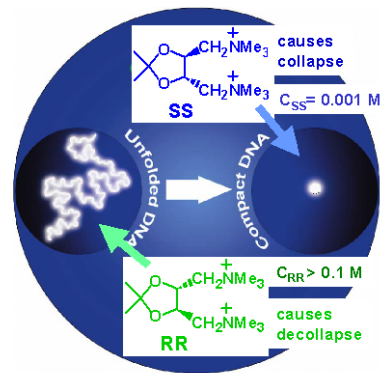


Fig.5. Chiral recognition in DNA collapse.