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Trapping and Condensing DNA at the Air/Water Interface
JAIME RUIZ-GARCIA, Instituo de Fisica – UASLP — DNA is a highly charged polyelectrolite and as such it is considered to be completely soluble in pure water. Surprisingly, we found that DNA can be trapped at the air/water interface and does not go back into a pure water subphase. Once at the interface, DNA molecules condense to form different two-dimensional mesostructures such as foams, giant rings, disks and rods at low density. This condensation occurs without the presence of multivalent cationic ions, as it is required in bulk, for example in condensing DNA toroids. At high density, the molecules form a regular monomolecular network. At the interface, DNA is only partially immersed in water, which originates that the chains get only partially charged, but the charges are of the same sign. Therefore, this can be considered another case of like-charge attraction, similar to those found in colloids trapped between glass plates and at the air/water interface. However, the origin of the attractive part of the interaction potential is unknown. In addition, we found that DNA at the air/water interface can form 2D smectic-like domains tens of microns in size, which are interesting from a theoretical and application standpoints.

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