

Desoxyribosenucleic acid, DNA, and cellulose molecules self-assemble in aqueous systems. This aggregation is the basis of the important functions of these biological macromolecules. Both DNA and cellulose have significant polar and nonpolar parts and there is a delicate balance between hydrophilic and hydrophobic interactions. The hydrophilic interactions related to net charges have been thoroughly studied and are well understood. On the other hand, the detailed roles of hydrogen bonding and hydrophobic interactions have remained controversial. It is found that the contributions of hydrophobic interactions in driving important processes, like the double-helix formation of DNA and the aqueous dissolution of cellulose, are dominating whereas the net contribution from hydrogen bonding is small. In reviewing the roles of different interactions for DNA and cellulose it is useful to compare with the self-assembly features of surfactants, the simplest case of amphiphilic molecules. Pertinent information on the amphiphilic character of cellulose and DNA can be obtained from the association with surfactants, as well as on modifying the hydrophobic interactions by additives.