

A Smart Material in Long-term DNA stability

Sanjib Senapati

Dept of Biotechnology, I.I.T. Madras, Chennai 600036, India

E-mail: sanjibs@iitm.ac.in

Very recently, hydrated ionic liquids (ILs) have been identified as ideal media for long-term DNA storage. Hence, understanding the binding characteristics and molecular mechanism of interactions of ILs with DNA is of both practical and fundamental interest. We employ molecular dynamics (MD) simulations and spectroscopic experiments to unravel the key factors that stabilize DNA in hydrated ILs. Both simulation and experimental results show that DNA maintains the native B-conformation in ILs. Simulation results further suggest that, apart from the electrostatic association of IL cations to DNA backbone, groove binding of IL cations through hydrophobic and polar interactions contribute significantly to DNA stability. CD spectral measurements and fluorescent dye displacement assay confirm the intrusion of IL molecules into the DNA minor groove. In the later half of the talk, I will briefly discuss how ILs can maintain dehydrated DNA in B-form.