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Reversible Structural Transition of a DNA Lipid Film. MATTHEW TIRRELL, SUREKHA GAJRIA, THORSTEN NEUMANN, LUC JAEGER, University of California, Santa Barbara, MATERIEALS RESEARCH LABORATORY COLLABORATION — Polyanions such as nucleic acids (RNA and DNA) can self-assemble with cationic lipids via electrostatic complexation, driven thermodynamically by the release of counterions. The structures of these complexes in water have been studied extensively and are recognized as potentially useful in the field of gene delivery. The structure of films in water is dominated by the nature of the lipid. Within these lamellar complexes in aqueous solution the lipid assumes a bilayer formation and the DNA is a double helix. It is possible to obtain dry nucleic acid-lipid films when the dissolved cationic lipid complex of DDAB and nucleic acid is cast on a solid. These self-standing films have been characterized by tensile properties and nucleic acid intercalation experiments. The tensile properties of these films are adjustable by mixing different molecular weights. It was expected that these films would have the same characteristic structure as these complexes in water. However, our work shows that the film undergoes a transition from double stranded helical DNA complexed with a bilayer of DDAB in the wet state, while in the dry state we observed a repeat unit of single stranded DNA complexed with a monolayer of DDAB.

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