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Calorimetric and Low-Frequency Dielectric Studies of Mesoscopic Ordering in Solutions of Engineered DNA Hairpin Fragments K. KASHURI, H. KASHURI, G.S. IANNACCHIONE, WPI — Calorimetry (both AC and MDSC) from 20 to 100 ^{o}C, as well as low-frequency (0.1 to 100 kHz) isothermal dielectric measurements have been performed on solutions of DNA fragments as a function of concentration. Custom hairpin DNA fragments were obtained with 13-base unit length and samples made in solution at various concentration. Results show a reproducible heat capacity C_p signature on heating and cooling scans. This thermal behavior of a diluted oligonucleotide chain is very different from that seen for mesoscopic ordering of liquid crystals. The AC Cp peak vanishes and new features are revealed as the temperature scan rate is lowered to 0.017 K min^{-1}. The observed real, ϵ', and imaginary, ϵ'', permittivity of the suspended DNA show features indicating low-frequency dynamics that in turn suggests large-scale ordering or agglomeration of the DNA hairpin loops.

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