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Bubbles in DNA YAN ZENG, GIOVANNI ZOCCHI, UCLA, PHYSICS DEPARTMENT, BIOPHYSICS LAB TEAM — DNA melting proceeds through the formation of ?bubbles?. We have developed a new ensemble method by which we can directly measure the average length of the denaturation bubble and the statistical weights of the bubble states within the transition. For a bubble flanked by double-stranded regions, we find a nucleation size of $\sim$20 bases. In contrast, for bubbles opening at the ends of the molecule there is no nucleation threshold. An analysis of the statistical weight of intermediate states versus the length of the molecule L shows that the transition becomes strictly two-state only for L$\sim$1. We further find that a single mismatch in the oligomer sequence transforms a transition with many intermediate states into a nearly two-state transition. This observation can form the basis for an improved SNP (single nucleotide polymorphism) detection assay.

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