A simple quantitative model for the reversible association of DNA coated colloids REMI DREYFUS, MIRJAM LEUNISSEN, ROUJIE SHAH, New York University, ALEXEI TKACHENKO, University of Michigan, NADRIAN SEEMAN, DAVID PINE, PAUL CHAIKIN, New York University — We investigate the reversible association of micrometer-sized colloids coated with complementary single-stranded DNA 'sticky ends' as a function of the temperature and the sticky end coverage. We find that even a qualitative description of the dissociation transition curves requires the inclusion of an entropic cost. We develop a simple general model for this cost in terms of the configurational entropy loss due to binding and confinement of the tethered DNA between neighboring particles. With this easy-to-use model, we demonstrate for different kinds of DNA constructs quantitative control over the dissociation temperature and the sharpness of the dissociation curve, both essential properties for complex self-assembly processes.

Remi Dreyfus
New York University

Date submitted: 21 Nov 2008

Electronic form version 1.4