

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Linear DNA-linked colloidal chains: a model to visualize polymer dynamics¹ SIBANI BISWAL, JULIE BYROM, DANIEL DU, Rice University — We present the development of synthetic materials consisting of chains of DNA-linked paramagnetic colloids that have rigidity and length specificity. These chains have demonstrated capability for folding and self-assembly. This is classic bead-spring-bead model can be a model system to visualize polymer dynamics. Here, I will describe the formation mechanism and stability of these DNA-linked magnetic particle chains. I will also describe a model that describes the total energy landscape that describes the inter-particle interactions and provides a workable theory toward the optimization of experimental parameters in synthesizing more stable and reliable colloidal assemblies. In addition to stability, we will also present the use of a colloidal worm-like chain (WLC) model system to describe chain dynamics. We measure bending rigidity by monitoring the thermal fluctuations of the chains. We show that the persistence length of the chains can be tuned from 1 to 50 nm ($L/LP = 0.002 - 0.1$), by changing the length of the DNA used to link adjacent particles from 75 to 15 bases. We also will show that the bending relaxation dynamics of these chains, which match well with theoretical predictions, further supporting the validity of using these colloidal chains as models for semiflexible polymer systems in both equilibrium and dynamic studies.

¹We acknowledge NSF CAREER CBET 0955003 for support

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Date submitted: 11 Nov 2011

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