

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Kinetics of Assembly and Dis-assembly of Structures Forming a Chromonic Liquid Crystal at Low Concentrations¹ KENNETH NIESER, PETER COLLINGS, Department of Physics & Astronomy, Swarthmore College, Swarthmore, PA 19081 — The molecules of the near-IR absorbing dye IR-806 spontaneously assemble in water at very low concentrations, forming a chromonic liquid crystal phase at room temperature when the concentration is above 0.5 wt%. The assembly process proceeds in two steps and results in a complex structure that orientationally orders in a liquid crystal phase. The kinetics of the assembly and dis-assembly of these complex structures can be followed through absorption measurements by rapidly mixing the initial sample with either a small fraction of salt solution (assembly) or a large fraction of water (dis-assembly). The kinetics of dis-assembly is exponential while the kinetics of assembly is non-exponential, both with rate constants depending on the starting and ending conditions, but falling in the 0.1-1.0 s⁻¹ range. While past equilibrium absorption measurements on IR-806 offer evidence for a threshold concentration for the assembly of these complex structures, the kinetics experiments show with certainty the existence of such a threshold. Similar experiments on Benzopurpurin 4B, another dye that forms a chromonic liquid crystal at low concentrations, reveal kinetics that are slower by two orders of magnitude and a threshold concentration for the assembly of complex structures.

¹Acknowledgment is made to the donors of the American Chemical Society Petroleum Research Fund for partial support of this research.

Peter Collings
Department of Physics & Astronomy,
Swarthmore College, Swarthmore, PA 19081

Date submitted: 26 Nov 2012

Electronic form version 1.4