Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Structure and Interactions in Neurofilament Networks JAYNA JONES, M. OJEDA-LOPEZ, C.R. SAFINYA, (Materials, MCDB, & Physics Departments, UCSB) — Neurofilaments (NFs) are a major constituent of nerve cell axons that assemble from three subunit proteins of low (NF-L), medium (NF-M), and high molecular weight (NF-H) to form a 10 nm diameter rod with radiating sidearms. The sidearm interactions result in an oriented network of NFs running parallel to the axon. Here, we reassemble NFs *in vitro* from varying weight ratios of two of the subunit proteins, NF-L and NF-M, purified from bovine spinal cord. We demonstrate the formation of the NF network where synchrotron x-ray scattering (SSRL) reveals a well-defined interfilament spacing, while the defect structure in polarized optical microcopy shows the liquid crystalline nature. The interfilament spacing varies depending on NF-M sidearm density and we relate this change to sidearm interactions. We show that at a low density of sidearms, repulsive forces dominate creating a lattice spacing that is regulated by the buffer volume. With an increasing sidearm density, the equilibrium interfilament spacing decreases as a result of competing repulsive and attractive forces. Supported by NIH GM-59288, NSF DMR- 0203755, & CTS-0404444.

Jayna Jones

Date submitted: 12 Jan 2005 Electronic form version 1.4