Abstract Submitted for the MAR05 Meeting of The American Physical Society

Self-Assembly of Natural Silk Fibroin under Osmotic Stress SUNGKYUN SOHN, Polymer Science and Engineering, Univ. of Massachusetts Amherst, TAMAKO HATA, National Institute of Agrobiological Sciences, Japan, HELMUT H. STREY, SAMUEL P. GIDO, Polymer Science and Engineering, Univ. of Massachusetts Amherst — Osmotic stress method was applied to investigate the supramolecular self-assembly behavior of natural silk fibroin within the gland. As with the experiments on re-generated silk fibroin, poly(ethylene glycol) 8K was used to apply an osmotic stress of 0.2-7.6 MPa to the gland of Bombyx mori silkworm, in vitro. Fibroin samples were extracted from the fibroin-dominant, water-soluble posterior region, and from three different parts in the middle region of the gland. Calcium chloride of 0.01 M was added to each stressing solution to balance the physiological salt content of the sample. Microscopic and thermodynamic details of this self-assembly process along the spinline have been assessed by wide angle X- ray diffraction, optical microscopy, etc. It is apparent that as osmotic stress increases, isotropic silk fibroin molecules in the posterior region are assembled together to form a water-soluble crystalline mesophase known as silk-I. Further increases in osmotic stress induce an anti- parallel beta-sheet structure known as silk-II.

> Sungkyun Sohn Univ. of Massachusetts Amherst

Date submitted: 07 Feb 2005

Electronic form version 1.4