Electronic Supplementary Information for "From soft to hard rod behavior in liquid crystalline suspensions of sterically stabilized colloidal filamentous particles"

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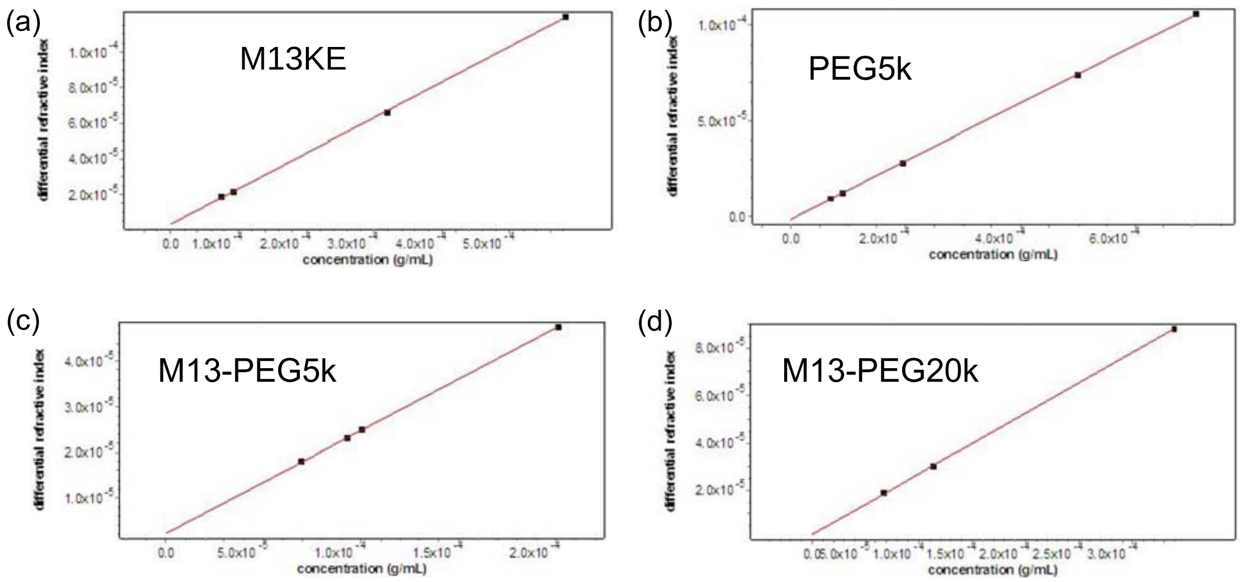

FIG. 1. Differential refractive index as a function of concentration for (a) M13KE, (b) PEG5k, (c) M13-PEG5k, (d) M13-PEG20k. The refractive index increments (dn/dc) are obtained from the slope of the linear fit (red solid line) in each graph.

TABLE I. Refractive index increment values determined for PEG polymers, bare M13KE viruses and PEGylated viruses. The average number N_{exp} of PEG polymers grafted per virus is indicated according to Eq. 1.

Systems	dn/dc	Polymers per virus, N_{exp}
M13KE	0.1988	-
PEG	0.1520	-
M13-PEG5k	0.2256	596
M13-PEG20k	0.2553	329

I. EXPERIMENTAL DETERMINATION OF THE NUMBER OF PEG POLYMERS PER VIRUS

The amount of PEG-NHS grafted per virus was measured thanks to refractive index increment experiments (dn/dc) performed on PEG-NHS polymers, bare M13KE viruses and PEGylated viruses [1]. Since dn/dc is proportional to the mass density, the difference in dn/dc values between the bare viruses and the PEGylated ones is directly proportional to

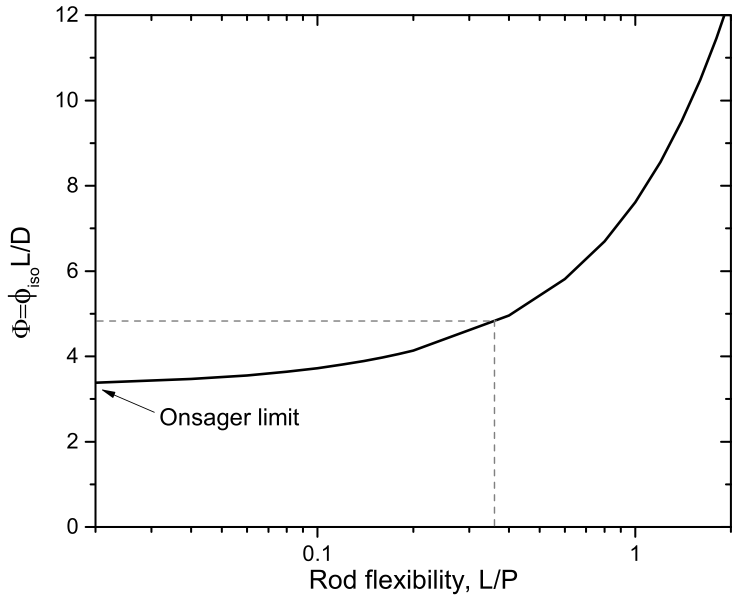

FIG. 2. Dimensionless concentration Φ as a function of the rod flexibility L/P as predicted by Chen [2]. The dashed lines indicate the case of rod-like viruses studied in this work for which $L/P = 0.36$ and $\Phi = 4.8$.

the number of polymers grafted per virus, N_{exp}, according to the following equation:

$$N_{exp} = \frac{(dn/dc)_{M13-PEG} - (dn/dc)_{M13KE}}{(dn/dc)_{PEG}} \times \frac{M_w}{M_w^{PEG}} \tag{1}$$

The determination of dn/dc values for the three samples in the same buffer were done by injecting aliquots of known concentration into an Optilab rEX refractive index detector (Wyatt technology, USA) as shown in Figures 1. The results are summarized in Table I.

II. EXTENSION OF ONSAGER THEORY TO SEMI-FLEXIBLE RODS

Chen proposed an accurate solution of the Onsager theory in case of semi-flexible rods [2]. The result of the isotropic volume fraction ϕ_{iso} at the I-N transition is provided as a function of the rod flexibility L/P via $\phi_{iso} = \Phi \times D/L$, where L, D and P are the rod contour length, diameter and persistence length, respectively. As shown in Fig. 2, the I-N transition shifts to higher densities with increasing rod flexibility.

[1] E. Grelet and S. Fraden, *What Is the Origin of Chirality in the Cholesteric Phase of Virus Suspensions?*, Phys. Rev. Lett. **90**, 198302 (2003).

[2] Z. Y. Chen, *Nematic Ordering in Semiflexible Polymer Chains*, Macromolecules **26**, 3419 (1993).