ERRATA

Erratum: Micellar-shape anisometry near isotropic−liquid-crystal phase transitions [Phys. Rev. E 47, 2551 (1993)]

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In our paper the binary sodium dodecyl (lauryl) sulfate (SLS)−water system was investigated by small-angle x-ray scattering in the isotropic (I) phase up to the I-hexagonal (H_α) transition and the ternary system (with decanol added to a binary system containing 26 wt% of SLS in water) up to what was considered to be an I-nematic cylindrical (N_c) phase transition. Our paper did not focus on the phase diagram of the studied system but rather on the detailed modeling of the scattering curves in the I phase in terms of particle form factor and interference function. The aim of the paper was to determine the particle anisometries in the I phase as I−liquid-crystal phase transitions were approached, and to compare it with theories that predicted I-(N)-H phase transitions in systems with self-association [1].

In the ternary system, five samples were investigated upon increasing decanol addition: samples AM1, AM2, and AM3 in the I phase, and sample AM4 (considered to correspond to an $I+N_c$ coexistence) and a sample in the N_c phase. The decanol content was measured in terms of the decanol:SLS molar ratio (M_d) for samples with the fixed water:SLS molar ratio (M_w=45.2).

In this erratum, we show that, in fact, sample AM4 (M_d=0.195) corresponds to an H_α phase, intercalated between the I and the N_c phases upon decanol addition.

Although I-N_c phase transitions do occur in the ternary system for low SLS concentration, the sequence of phases $I \rightarrow H_\alpha \rightarrow N_c \rightarrow N_d$ (nematic discotic)$\rightarrow L_\alpha$ (lamellar) was observed by Quist et $al.$ [2] in the region of higher SLS concentration. The phase diagram of Quist et $al.$ [2] reproduced the nematic domain previously found by Amaral et $al.$ [3,4] at lower SLS concentration and the limits of the H_α phase obtained by Ekwall [5] when the nematic domain was not known yet. From Quist's phase diagram, the transition is $I \rightarrow N_c$ for the concentrations reported in our previous paper, but the sequence I-H_α-N_c could not be ruled out, since small differences in the materials' purity and temperature are possible.

X-ray results obtained by the photograph method mentioned in our paper are shown here in Fig. 1 for samples AM3 [Fig. 1(a); I phase], AM4 [Fig. 1(b)], and N_c phase [Fig. 1(c)]. In our paper, only the s^{-1} position of the first interference peak obtained from these photos was given in Table II; no careful measurements of the remaining peaks was made at that time. From this figure, it seems clear that the sample AM4 [Fig. 1(b)] is neither an I nor a N_c phase. An $I+N_c$ coexistence was assumed in our paper because an I-N_c transition was expected from the previous phase diagrams [2,4] and from the theory [1]; sample AM4 was clearly neither I nor N_c between crossed polarizers in the test tube but no clear phase separation was observed.
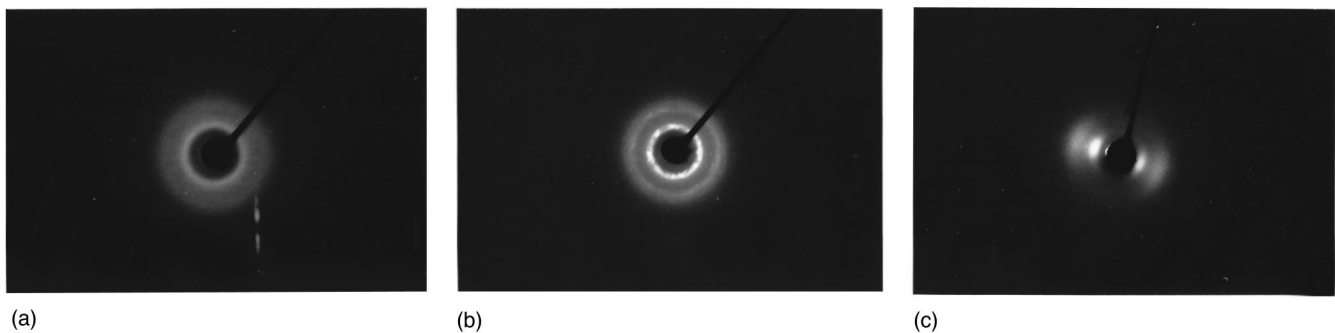

(a)   (b)   (c)

FIG. 1. X-ray diffraction results obtained by means of photographic technique (Laue transmission geometry; 10 cm sample-to-detector distance; CuK$_\alpha$-Ni filter radiation) from the samples: (a) isotropic AM3; (b) AM4; and (c) N_c, investigated in our paper. The N_c sample shows spontaneous surface orientation.

Only recently, we focused on the possibility that the H_α phase could be present. A revision of the x-ray Laue photograph obtained with sample AM4 showed that there are three diffraction lines (the second stronger and the third weaker are very near) at $s^{-1} = 56.0$, 33.2, and 27.9 Å, in the ratio of about $1:1/\sqrt{3}:\frac{1}{2}$, with some texture (notice that the diffraction lines are measured on the original photograph, where they are better defined than in the glossy copy of Fig. 1). In our paper the second and third lines were seen together as a second order (which appears in both the I and N_c phases).

The statement "for AM4 sample, I-N_c phase coexistence was observed" in the caption of Table II was in error. AM4 corresponds in fact to a H_α phase, since the second diffraction line at $1/\sqrt{3}$ is a "fingerprint" of this phase. The composition of sample AM4 was now repeated and x-ray results reproduced. Furthermore, observation in a polarized optical microscope showed birefringence in the whole sample. This phase was homogeneous and no phase separation occurred after several days of observation in the sample tube and in the capillaries.

Therefore, the correct phase sequence is $I \rightarrow H_\alpha \rightarrow N_c$ upon increasing decanol concentration in the studied ternary system and not $I \rightarrow N_c$, as was previously assigned in our original paper. This also requires a revision of our comparison with Taylor and Herzfeld's theoretical results [1]. The inversion of the predicted [1] I-N-H to the observed I-H-N behavior has to do with the fact that the theory holds only for binary systems, and it is not able to take into account properly the effect of the third component. The observed I-H_α transition in the ternary system may be identified with the I-H behavior of the theory. The anisometry $\nu = 3$, obtained in the ternary system for sample AM3 in the vicinity of the I-H_α transition, indicates that this H_α phase in the ternary system must be very close to the triple point that separates I-H and I-N-H behaviors. An understanding of the observed H_α-N_c transition needs further investigation of the decanol effect upon the H_α phase and cannot be trivially explained by the theoretical model of self-association in binary systems.

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Erratum: Analytic solutions of some coupled nonlinear equations
[Phys. Rev. E 56, 7253 (1997)]

F. T. Hioe

On p. 7254, C_1 of solutions VI and VII should read as follows:

Solution VI: $C_1 = C(-B + 4A)/30$;

Solution VII: $C_1 = (C/2)[-\frac{1}{5}\sqrt{\frac{5}{3}(B^2 - A^2)} + \frac{1}{3}(B - A)]$.

On the same page, Φ and Ψ on the left-hand side of the first part of Eq. (2.3) should be replaced by Φ_1 and Φ_2, respectively.