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'Thermodynamic, structural and morphological studies on liquid-crystalline blue phases' by H. Stegemeyer, Th. Blümel, K. Hiltrop, H. Onusseit and F. Porsch

P. Pieranski[a]; P. E. Cladis[b]
[a] Physique des Solides, Universite Paris-Sud, Orsay, France [b] AT & T Bell Laboratories, Murray Hill, New Jersey, U.S.A.

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COMMENT

'Thermodynamic, structural and morphological studies on liquid-crystalline blue phases' by H. Stegemeyer, Th. Blümel, K. Hiltrop, H. Onusseit and F. Porsch

by P. PIERANSKI
Physique des Solides, Universite Paris-Sud, 91405 Orsay, France
and P. E. CLADIS
AT & T Bell Laboratories, 600 Mountain Avenue, Murray Hill, New Jersey 07974, U.S.A.

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In the review article on cholesteric blue phases by Stegemeyer *et al.* [1], table 3 lists [100] as the second largest BPI facet and the largest BPII facet. If such is the case, then, it is important to realize that it is unlikely the body centred cubic phase of BPI has $O^8(I4_132)$ symmetry and the simple cubic phase of BPII, $O^2(P4_232)$ symmetry [2–4].

Donnay–Harker rules [5] predict the relative size of [*hkl*] facts for a given crystal symmetry. With increasing growth rate, the Donnay–Harker prediction for $O^8(I4_132)$ is [110], [211], [310], [111] and [321]. This is the sequence we observe for BPI [2, 3]. The sequence in table 3 [1] is consistent with I432, not $I4_132$, symmetry [5]. Perhaps the discrepancy between our results and those of [1] is that they (see for example figure 17) [1] take an edge for a facet.

BPII does not exhibit [100] facets either, except in an electric field [4]. The square crystals shown in figure 14 [1] are limited laterally by [110] facets not [100] facets. This is consistent with $O^2(P4_232)$ symmetry for which the Donnay–Harker sequence is [110], [111], [100], [210] and [211]. We observe the first two facets in the usual way. We can induce the [100] facet to grow by applying an electric field [4].

Thus, the facet sequence in table 3 [1] has not been observed in BPI nor BPII. The sequence that *is* observed in BPI [2, 3] is the Donnay–Harker sequence for O^8 and in BPII [4], the Donnay–Harker sequence for O^2. The *absence* of [100] facets in BPI and BPII is consistent with this axis being a screw axis in both phases [2].

References

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[5] See, for example, PHILLIPS, F. C., 1960. *An Introduction to Crystallography* (Longmans Green) p. 306.