

Influence of electron-donating/withdrawing substituents ratio on A₃B-type phthalocyanines self-organization

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Mesomorphic properties and structures of two mix-substituted phthalocyanine (Pc) derivatives of the A₃B type, with a different ratio of electron-donating (hexadecyloxy-) and electron-withdrawing (Cl-) substituents on the isoindol fragments 'A' and 'B', correspondingly (Figure 1), were studied by polarising optical microscopy [1, 2], differential scanning calorimetry and small-angle X-ray scattering [3]. Both compounds display columnar mesophases, and the type of organisation of the columns in the mesomorphic state was found strongly depended on the number of peripheral chlorine substituents in the molecule.

The Pc columns of the dichloro-derivatives associate three-by-three into approximately cylindrical bundles with the chlorine substituents in the core, and these bundles arrange in turn according to a large-size hexagonal columnar lattice. No association in bundles on the contrary occurs for the tetrachloro-derivative, and columns hence stay isolated and irregularly spaced by the asymmetry of the periphery, so that only orientational long-range order is kept and a nematic columnar (N_{CoI}) mesophase is displayed at any temperature. The reason for this different self-assembling is discussed.

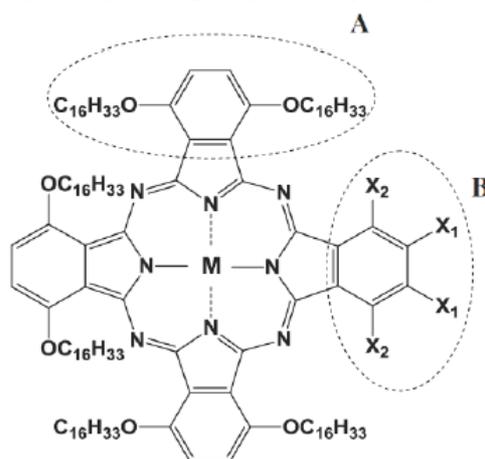


Figure 1. Structural formula of the studied mix-substituted phthalocyanines of A₃B type: I (H₂-Pc(OC₁₆H₃₃)₆-Cl₂): M = 2H⁺, X₁ = Cl, X₂ = H; II (H₂-Pc(OC₁₆H₃₃)₆-Cl₄): M = 2H⁺, X₁ = X₂ = Cl.

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References

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