

## Synthesis and Phase Behaviour of $\beta$ -Octaalkyl Porphyrins

G. C. Shearman<sup>a</sup>, G. Yahioğlu<sup>a,b</sup>, J. Kirstein<sup>a</sup>, L. R. Milgrom<sup>b</sup>, J. M. Seddon<sup>a</sup>

*a* Department of Chemistry, Imperial College London, London, SW7 2AZ, U.K.

*b* PhotoBiotics Ltd., 21 Wilson Street, London, EC2M 2TD, U.K.

A homologous series of three octakis-alkyl-substituted porphyrin (OAP) derivatives with alkyl chain lengths of C<sub>8</sub>, C<sub>10</sub> and C<sub>12</sub> has been synthesised. For each compound, both the free-base (i.e. two H-atoms) and the fourfold coordinated zinc complex were investigated, where the latter for each chainlength was found to exhibit liquid crystalline mesophase behaviour (1). At low temperatures all three metal coordinated compounds formed a solid phase with a structure based on a square packing of columns with a stacking periodicity of approximately 4.5 Å. At increased temperatures the square packed solid S phases undergo phase transitions to liquid-crystalline columnar phases (Figure 1) based on centered rectangular lattices of C2/m symmetry, with the ratio of the lattice parameters, *a/b*, ranging between 1 and 1.732. The *a/b* ratio exhibited two discontinuous jumps with increasing temperature prior to melting to the isotropic phase for Zn-OAP-C<sub>8</sub>, implying the existence of three columnar phases denoted Col<sub>r1</sub>, Col<sub>r2</sub> and Col<sub>r3</sub>. For the longer chainlength compounds, the number of mesophases formed was reduced, first to two for Zn-OAP-C<sub>10</sub>, then to one for Zn-OAP-C<sub>12</sub>.

### Reference

(1) G. C. Shearman, G. Yahioğlu, J. Kirstein, L. R. Milgrom, J. M. Seddon *J. Mater. Chem.* **2009**, *19*, 598.

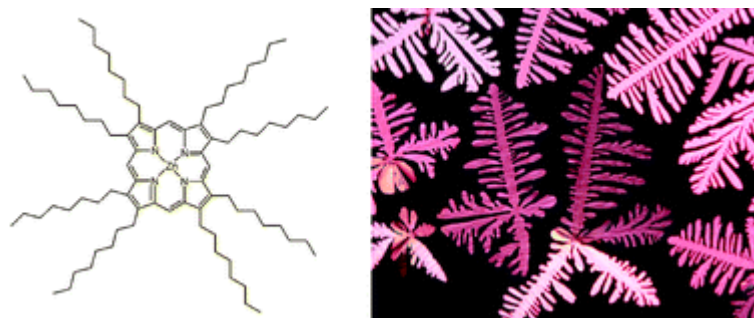


Figure 1. Optical texture of the C<sub>8</sub> Zn porphyrin compound after cooling slowly from the isotropic phase into the columnar liquid crystal phase.