

**Low Hydration Phase Properties of Phospholipid Mixtures  
Evidence for Dehydration-Induced Fluid-Fluid Separations**

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**Abstract.** An experimental investigation of the low hydration phase properties of phospholipid mixtures is described.  $^2\text{H}$  ( $\text{D}_2\text{O}$ ) NMR, X-ray diffraction and differential scanning calorimetry have been used to elucidate the phase properties of mixtures of the mixed chain phospholipids palmitoyloleoylphosphatidylcholine (POPC) and palmitoyloleoylphosphatidylethanolamine (POPE). At 10% hydration pure POPE exhibited a  $\text{H}^-$  phase above 330 K, a fluid lamellar phase below 315 K, and a minimally hydrated crystalline phase below 300 K. For the 1:1 mixture, the samples exhibited only gel or fluid phases between 270 K and 360 K for hydrations in the range 15% to 30%. Below 15% hydration the mixture exhibited two fluid phases with different repeat spacings, as predicted previously.

**Key words:** Phase separations – Membrane dehydration – Phospholipid phases – Lamellar phase – Inverse hexagonal phase – Mixed chain lipids – Deuterium NMR