1. **Introduction**

   The major components of biomembrane are protein and lipid, and phospholipid is typical lipid making up biomembrane. Dipalmitoyl lecithin (hereafter abbreviated as DPL) is a typical phospholipid, which is a synthetic lecithin with a fatty acid chain with 16 carbon molecules. When DPL ribosome is heated from room temperature, a phase transition takes place at about 41°C. This phase transition is considered to be the transition from the state in which the fatty acid chain of DPL is stretched along a straight line to the state in the liquid form, its head portion (hydrophilic) maintains long-range order, and is considered to be in a state of liquid crystal. (Figure 1)

   When this type of substance exists in nature, it is usually in the form of a solution with low concentration. Thus the thermal analysis of such a solution requires an instrument that is capable of measurement at low concentration.

   In this brief, the heat of phase transition of dipalmitoyl lecithin was measured by the DSC.

2. **Experiment**

   The concentration of DPL measured in this experiment ranged from 3.67mg/ml (0.367w%) to 36.7mg/ml (3.67w%). The sample weight was 60mg. The temperature was raised from 20°C to 160°C at 0.6°C/min. The sample was sealed in a hermetically sealed silver container so that the solvent would not evaporate at all.

3. **Measurements and Results**

   Figure 2 and 3 shows the measurement results of samples with concentrations of 14.68mg/ml and 3.67mg/ml, respectively. The temperature of phase transition and that of the small pre-transition agree well with the literature values\(^1\),\(^2\).

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**Figure 1**  Phase transition of phospholipid

- : filled circles represent heads of lipids including choline group.
- : lines represent fatty acid chains.
The heat of phase transition is calculated from the area under the peak. Figure 4 shows the variation in the heat of phase transition with changing sample concentration. The value 10.4mcal/mg (7.63Kcal/mol) of the heat of phase transition obtained from this graph agrees well with the literature values \(^1,2\).

This type of phase transition in lipids is known to vary with the addition of substances such as cholesterol \(^3\). Therefore, the measurement of the heat of phase transition by a scanning calorimeter is an effective method to study quantitatively the characteristics of lipids and biomembranes.

References