DSC measurement of an ionic liquid

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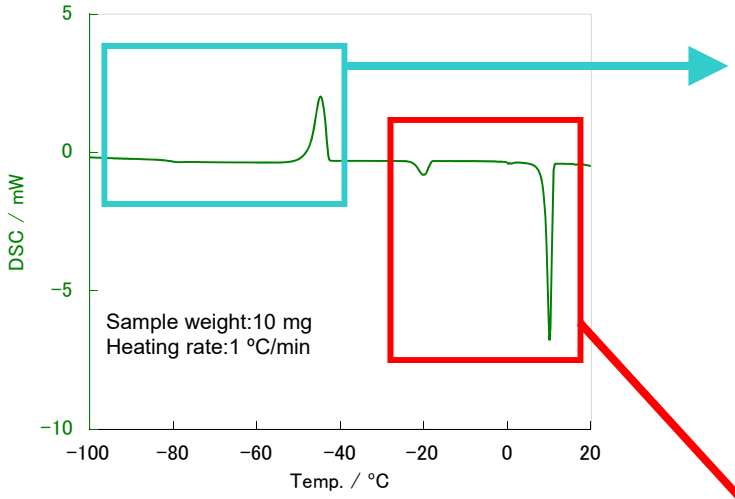
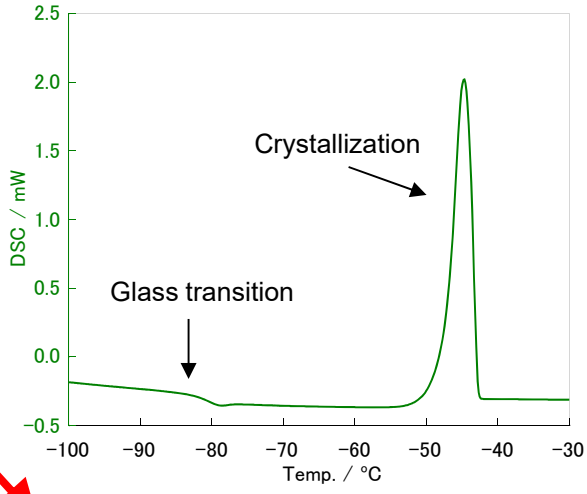
- Ionic liquid (IL) is a generic term for salts that are liquid at room temperature.
- ILs have numerous unique characteristics not exhibited by general molecular liquids, for example, high thermal stability, flame resistance, high ion conductivity, and specific solubility.
- Furthermore, since the majority of constituent ions are organic ions, ILs possibly exhibit various physical properties, which is another attraction.
- Considerable progress has been made recently using ILs in fields such as biology and organic synthesis, as well as in battery development and separation/extraction techniques.
- Observation of the crystal-crystal phase transition of 1-butyl-3-methylimidazolium hexafluorophosphate $[C_4mim]PF_6$, which is one of the most common ILs, has been reported by the Nishikawa laboratory at Chiba University.[1)] This laboratory possesses an originally special DSC featuring high temperature stability.
- Here, we introduce an example of DSC analysis of $[C_4mim]PF_6$ using our DSC7000X, which has high sensitivity and high resolution.

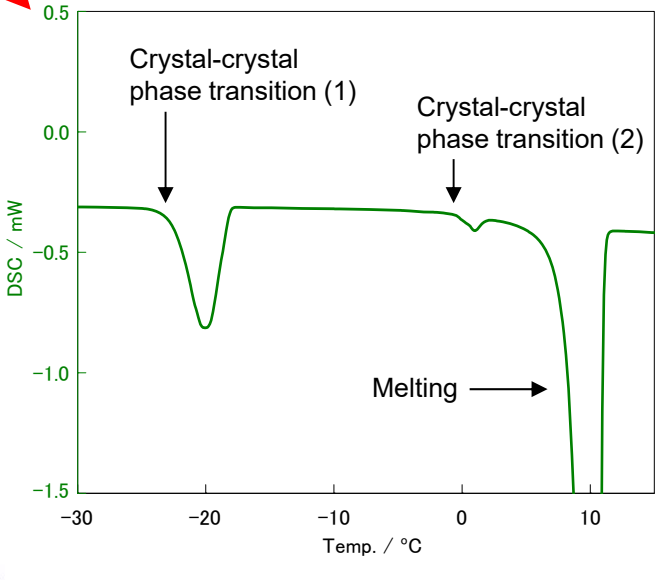
[1)] Takatsugu Endo, Tatsuya Kato, Kenichi Tozaki, Keiko Nishikawa; *J. Phys. Chem. B* **2010**, *114*, 407-411

Measurement Results





- $[C_4mim]PF_6$ exhibits a glass transition, an endothermic peak associated with crystallization, and an endothermic peak ascribed to melting at around -80 °C, -45 °C, and 10 °C, respectively, in the heating process.
- The two endothermic peaks between crystallization and melting are attributed to crystal-crystal phase transitions.
- Crystal-crystal phase transition (2) at around 0 °C in the figure to the right is close to the melting peak, and its peak intensity is extremely small. Therefore, it is too difficult to detect this peak if the DSC does not have
  - ① Stable baseline at low heating and cooling rate
  - ② High sensitivity
  - ③ High resolution



DSC7000X

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