

## RV-DSC Measurement of Thermal Expansion Capsules

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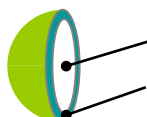
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Thermal expansion capsules can change their diameters from several microns to several hundred microns when heated. Generally, such capsules consist of a polymer with an aliphatic hydrocarbon (core) and a thermoplastic resin (shell). By mixing these capsules into plastic materials, they can be made lightweight, thermally insulating, and soundproof.

This report introduces a technique for characterizing the expansion and shrinkage of such capsules under the influence of temperature using the Real View DSC system.



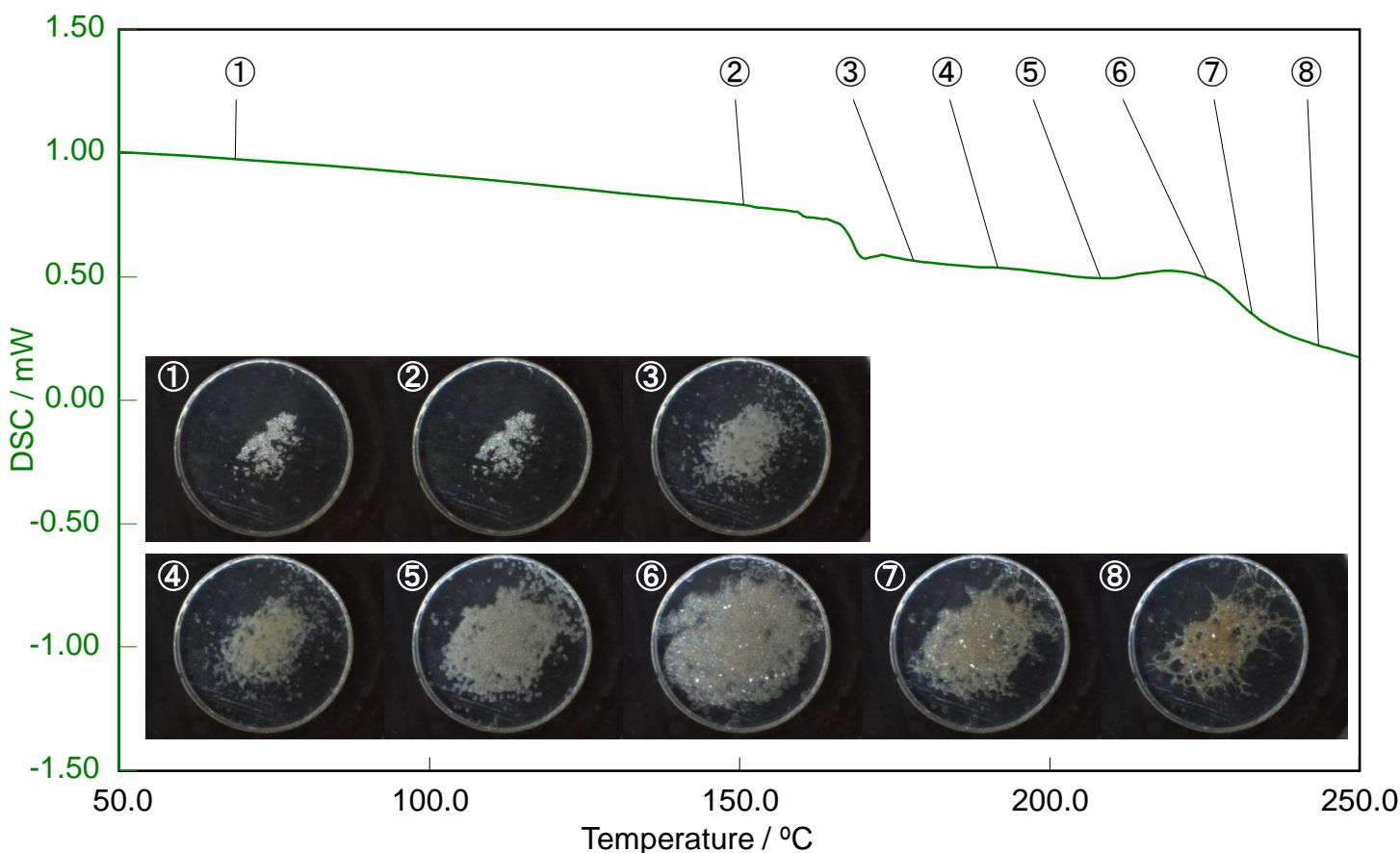
Real View DSC



Core (aliphatic hydrocarbon)

Shell (thermoplastic resin)

### Results



Thermal expansion begins between ② and ③, when a sudden scattering of particles is observed. Upon further heating, the particles suddenly expand (④ and ⑤) and the particle diameter reaches a maximum when an exothermic peak is observed in the DSC curve (⑥). Raising the temperature even higher results in shrinkage (⑦ and ⑧). The series of changes shown above correspond to I. Shell (thermoplastic resin) softening ⇒ II. Core (hydrocarbon) gasification and internal pressure increase ⇒ III. Capsule expansion ⇒ IV. Encapsulated gas escaping through the shell ⇒ V. Shrinkage.