

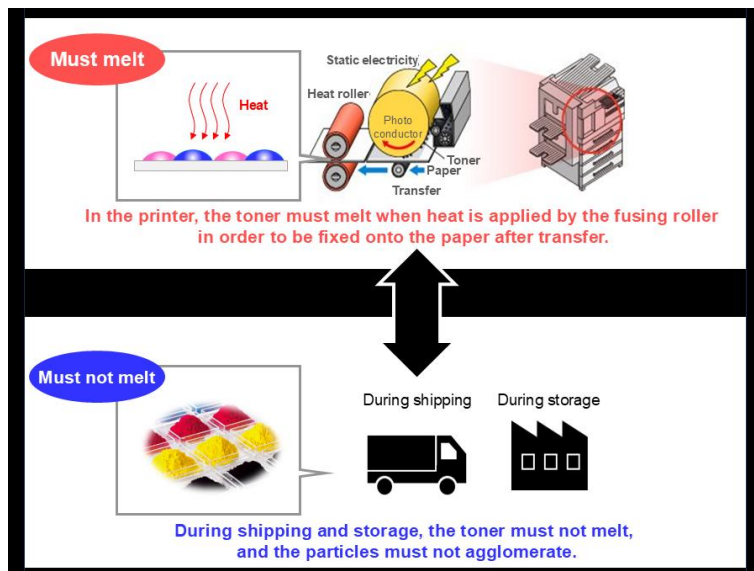
Thermoresponsive Encapsulated Toner



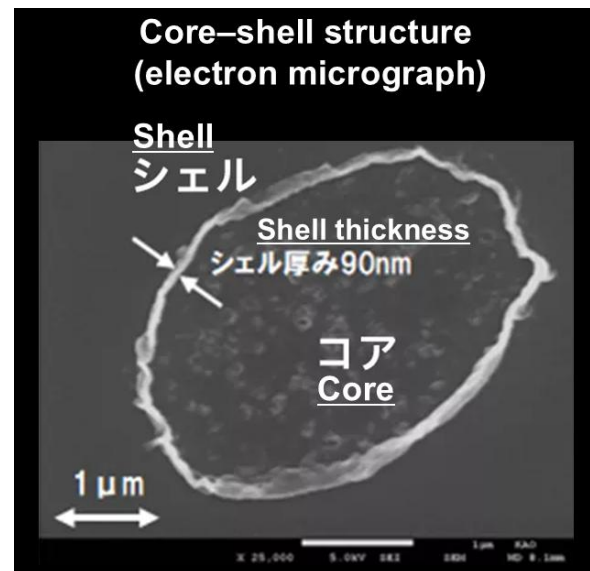
A technology that significantly reduces energy consumption in laser printing, which uses a powdered ink called toner. Conventionally, toner must be melted at high temperature inside the printer and fixed onto paper and other media. This technology encapsulates the toner in a core-shell capsule structure using materials with different thermoresponsive properties. As a result, it enables low-temperature melting during printing while maintaining storage stability. It contributes to energy savings and CO₂ emissions reduction, and expands printing to a wider range of media, including heat-sensitive films and labels.

<Unique Points>

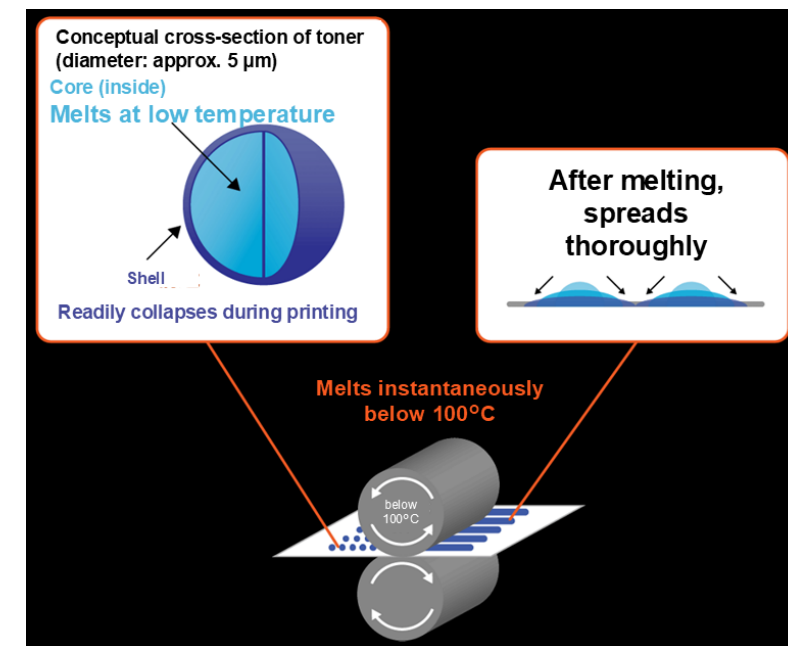
A key toner quality requirement is that it must not melt or soften at temperatures encountered in shipping containers or warehouses during storage, and that the particles must not agglomerate. For this reason, conventional toners were given excessive stability so that they would only begin to melt when heated by the high-temperature fusing rollers inside the printer (over 170°C).



To address this, a core-shell structure was developed in which a low-melting-point core containing pigment is encapsulated by a high-heat-resistant shell. The shell prevents particle agglomeration during shipping and storage.



During printing, the shell readily collapses, and the thermoresponsive material dispersed in the core melts instantaneously at low temperature (below 100°C), spreads, and fixes the toner pigment onto the substrate.



Thermoresponsive Encapsulated Toner

<Key Benefits>

- By reducing both power consumption during printing and toner usage, it lowers overall CO₂ emissions by approximately 40%.
- Enables printing on heat-sensitive materials (such as films and pouches) that were difficult to print with conventional printers, expanding printing flexibility.
- Because the toner fixes quickly at low temperature, it improves fusing-process efficiency and makes it easier to support high-speed printing.

<Link to Other Contents>

- Kao Chemicals Global
—Environmentally friendly next-generation toner
<https://chemical.kao.com/global/digital-printing-materials/lunatone/>
- Kao Chemicals Global
—Sustainable-chemical products
https://chemical.kao.com/global/sustainability/eco/article_02/

<Concerned Research Areas>

- Product Development Research:
 - Industrial Chemicals
<https://www.kao.com/global/en/innovation/research-development/product-development/chemicals/>
- Fundamental Research:
 - Material Science
<https://www.kao.com/global/en/innovation/research-development/fundamental/material-science/>
 - Production Technology
<https://www.kao.com/global/en/innovation/research-development/fundamental/production-technology/>