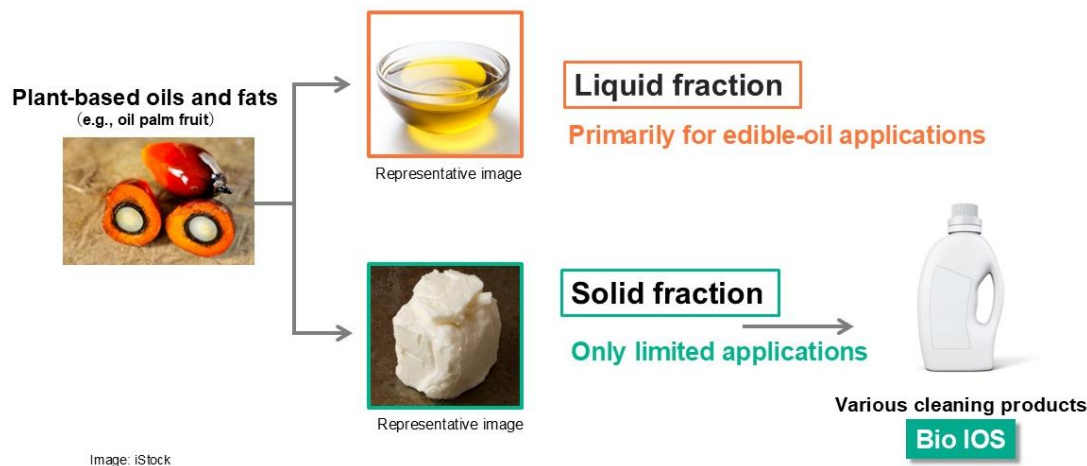


Bio IOS

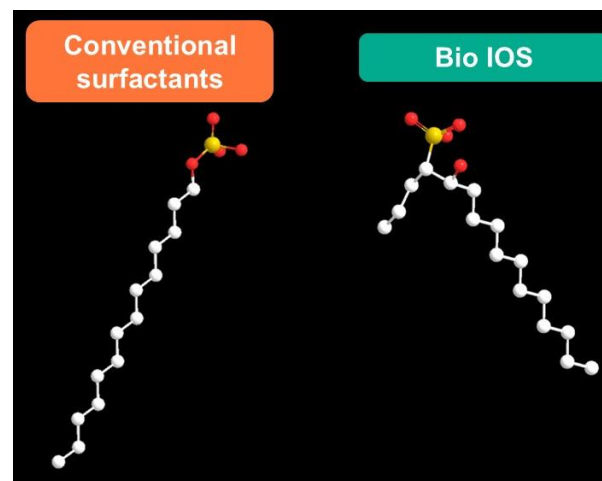
As global population growth puts the supply of oleochemical products—including detergents—at risk, this surfactant was developed as a “detergent surfactant for the SDGs era.” It enables the use of solid fats with high melting points—oils obtained from fruits such as oil palm—that have traditionally been difficult to use in cleaning products. Thanks to its kinked molecular structure, it delivers effective cleaning performance even at low dosages and can be used under low-temperature and hard-water conditions.

<Unique Points>

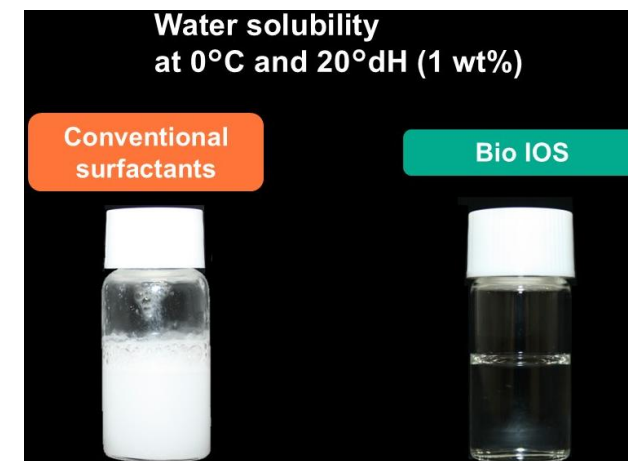
Plant-based feedstocks such as oil palm contain a “solid fraction with limited applications.” By focusing on this fraction—parts that have not traditionally been used in detergents—this technology is expected to support more stable supply.



The reason the solid fraction has been difficult to use in detergents is that it is insoluble in water. To overcome this challenge, a technology was developed to introduce a water-compatible “hydrophilic group” into the middle of the molecule, creating a kinked molecular structure.



With its distinctive kinked molecular shape, the material dissolves well in water and exhibits surfactant performance even at low dosages. It can also be used in low-temperature water and hard-water conditions.



Bio IOS

<Key Benefits>

- Helps avert a “cleaning crisis”—a scenario in which people around the world can no longer “wash” as an everyday, taken-for-granted routine.
- Helps reduce excessive environmental and ecosystem burdens, as well as social issues, caused by tropical deforestation (conversion to palm plantations) driven by growing demand for oleochemical feedstocks.
- Enables a reduction in the amount of surfactants added to detergent formulations, while also supporting cleaning needs in cold climates and hard-water regions.

<Link to Other Contents>

- Kao | Sustainable surfactant Bio IOS
<https://www.kao.com/global/en/innovation/research-development/bioios/>
- Kao News Release
 - Kao Develops Bio IOS, to Completely Transform the Concept of Conventional Detergent Bases
<https://www.kao.com/global/en/newsroom/news/release/2019/20190123-001/>
 - Mechanism of Bio IOS's Surface Activity and Water Solubility Elucidated, Paving the Way for Broader Applications of Sustainable Surfactants
<https://www.kao.com/global/en/newsroom/news/release/2022/20221221-001/>
- Bio IOS | Kao Chemicals
<https://chemical.kao.com/us/bioios/>
- Kao no Kao (Kao's research and technology website)
 - Laundry may become difficult in the near future...? Kao's “Bio IOS Technology,” looking ahead to the future of cleaning (Japanese only)
https://www.kao.com/jp/kaonokao/dna/11_3/
 - Cleaning Agents for the SDGs Era”: Kao's Commitment Through Bio IOS — Saving the World with the Power of Chemistry (Part 1) (Japanese only)
https://www.kao.com/jp/kaonokao/dna/11_1/
 - Kao Technologies Expanding Worldwide #001: Bio IOS (Japanese only)
https://www.kao.com/jp/kaonokao/kaonokao/001_bioios/

<Concerned Research Areas>

- Product Development Research: Fabric & Home Care <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/>
 - Analytical Science <https://www.kao.com/global/en/innovation/research-development/fundamental/analytical-science/>