

Small Molecules Repeatedly Dissolved and Turbid in Water in Response to Ambient Temperature

Expected application to temperature-responsive smart windows

Overview

There are known compounds that exhibit phase separation when solutes exceed a certain temperature (LCST). Poly (N-isopropylacrylamide) (PNIPAm) has been studied as a representative of these compounds, and applications to temperature-responsive smart windows have been reported. However, since the LCST of PNIPAm is constant at 31° C, a compound that can flexibly respond to the LCST depending on ambient temperature has been desired in industry.

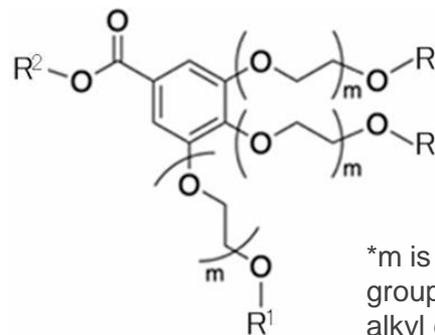
The inventors succeeded in synthesizing a new compound. This compound is characterized by the ability to control the LCST within the range of about 25~55° C by modifying a part of its structure. When applying to smart windows, most of them require a power supply because they switch between transmission and non-transmission by turning the voltage on and off. On the other hand, smart windows using this compound can be used in places without a power supply because they switch between transmission and non-transmission spontaneously according to changes in the outside temperature. Furthermore, by controlling the heat according to the degree of light transmission, it is expected to be effective against heat.

Product Application

- Temperature responsive smart window
- Temperature responsive film
- Material to visualize temperature changes
- Surfactant

IP Data

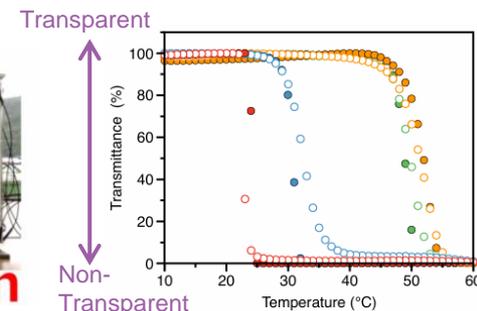
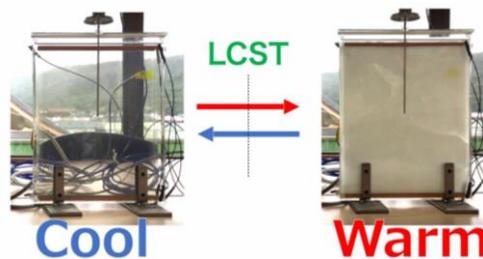
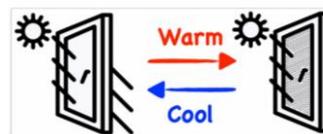
IP No. : JP2025-27996
 Inventor : MAWATARI Yasuteru, SAITO Shunsuke
 Admin No. : MU24-002



Molecular structure of compounds having LCST

*m is 2 or 3, R1 is a hydrogen or methyl group, and R2 is a normal or branched alkyl group with 3 or 4 carbons

Features・Outstandings



It becomes transparent at lower temperature than LCST and becomes turbid at higher temperature.

LCST changes by structural modification
 → Compounds with optimal LCST can be selected.

Related Works

[1] JST New Technology Briefing Announced on October 1, 2024 "Aqueous solution that uniformly dissolves when cooled and separates and becomes turbid when warmed, and its application"

https://shingi.jst.go.jp/list/list_2024/2024_hokkaido.html#20240709X-003

Contact

Tohoku Techno Arch Co., Ltd.

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