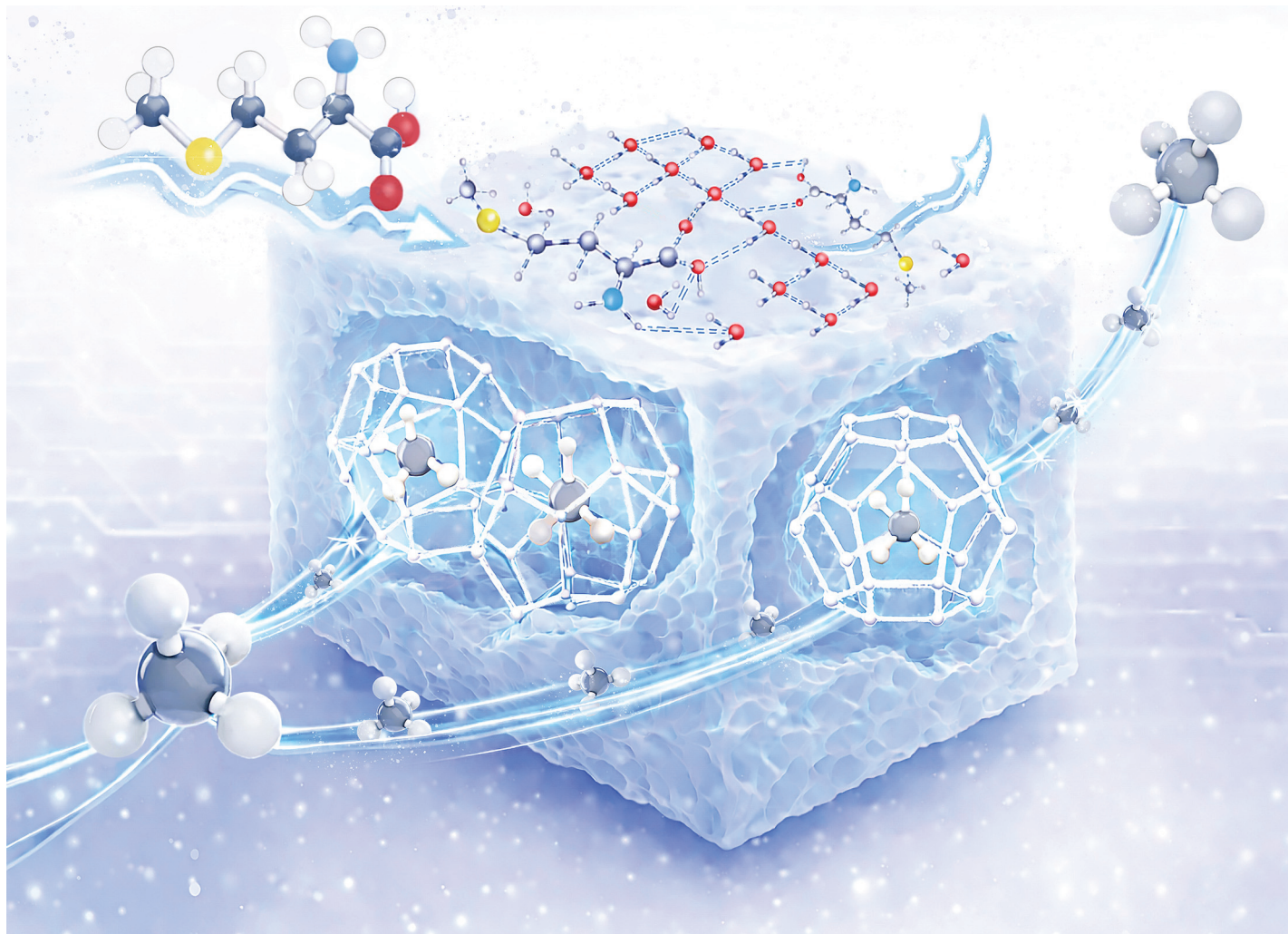


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Showcasing research from Professor Zhenyuan Yin's Natural Gas Hydrate and Carbon Storage laboratory from Tsinghua University, China.

L-Methionine modified active ice enables ultra-rapid methane hydrate kinetics for solidified natural gas storage

Hydrate-based natural gas storage represents a novel energy carrier solution distinguished by its inherent safety and environmental sustainability. Diverging from traditional use of promoters in the aqueous phase, we introduce a hydrophobic amino acid L-methionine to engineer "active ice", that enables ultra-rapid CH<sub>4</sub> hydrate kinetics at the solid-gas interface within few minutes. We reveal that active ice possesses a unique porous structure with a partially ordered hydrogen-bonding network, providing a critical kinetics enhancement pathway to facilitate large-scale commercial adoption.

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As featured in:



See Zhenyuan Yin *et al.*, *Green Chem.*, 2026, **28**, 5226.