

## Accepted Manuscript

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PII: S0167-7322(17)34790-6

DOI: <https://doi.org/10.1016/j.molliq.2018.01.024>

Reference: MOLLIQ 8478

To appear in: *Journal of Molecular Liquids*

Received date: 10 October 2017

Revised date: 2 January 2018

Accepted date: 4 January 2018

Please cite this article as: Yi Ye, Nanying Ning, Ming Tian, Liqun Zhang, Jianguo Mi , Thermodynamic and dynamical heterogeneities during glass transition of water. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), <https://doi.org/10.1016/j.molliq.2018.01.024>

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# Thermodynamic and Dynamical Heterogeneities during Glass Transition of Water

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**ABSTRACT:** Understanding the glass transition of water is still a major scientific challenge. Here we propose a dynamic density functional renormalization group approach to analyze the liquid-liquid phase transitions and diffusion dynamics of water molecules under supercooling condition. We find that, as the temperature approaches the glass transition point, the metastable phase transition displays the confined critical scaling behavior, and the dynamic correlation length actually diverges simultaneously. The predicted glass temperature is 142.5K, close to the experimental value of 136K. These results suggest a deep coupling feature of the thermodynamic and dynamical heterogeneities during the glass transition of supercooled water.

**Keywords:** Glass transition; Dynamic correlation length; Thermodynamic heterogeneity; DDFT; Renormalization group

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