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Structural signatures of dynamic heterogeneities in monolayers of colloidal ellipsoids[1] YILONG HAN, Hong Kong University of Science and Technology, ZHONGYU ZHENG, Chinese Academy of Science, Institude of Mechanics, RAN NI, Utrecht University, FENG WANG, Hong Kong University of Science and Technology, MARJOLEIN DIJKSTRA, Utrecht University, YUREN WANG, Chinese Academy of Science, Institude of Mechanics — we discovered two relationships between dynamic heterogeneity and structure for both translational and rotational motion in monolayers of colloidal ellipsoids by video microscopy: (1) the onsets of translational and rotational dynamic heterogeneities coincide with the maximum density fluctuation and the maximum orientation fluctuation respectively at aspect ratio ¿ 2.5; and (2) the dynamic slowest-moving clusters, the static glassy clusters and the low-entropy clusters are strongly correlated and their sizes diverge at the ideal glass transition point with the same power-law length scaling as a function of density, whereas the size of the fastest-moving clusters diverges at the mode-coupling critical point. These results show that the glass transition has a thermodynamic origin. In addition, we observed one-step and two-step glass transitions at different aspect ratios. All experimental results were confirmed by simulations.

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