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Structural signatures of dynamic heterogeneities in monolayers of colloidal ellipsoids[1] ZHONGYU ZHENG, YUREN WANG, Institute of Mechanics, Chinese Academy of Sciences, YILONG HAN, Hong Kong University of Science and Technology — When a liquid is supercooled towards the glass transition, its dynamics drastically slows down, whereas its static structure remains relatively unchanged. Finding a structural signature of the dynamic slowing-down is a major challenge, yet it is often too subtle to be uncovered. Here we discover the structural signatures for both translational and rotational dynamics in monolayers of colloidal ellipsoids by video-microscopy experiments and computer simulations. The correlation lengths of the dynamic slowest-moving clusters, the static glassy clusters, the static local structural entropy and the dynamic heterogeneity follow the same power-law divergence, suggesting that the kinetic slowing down is caused by a decrease in the structural entropy and an increase in the size of the glassy cluster. Ellipsoids with different aspect ratios exhibit single- or double-step glass transitions with distinct dynamic heterogeneities. These findings demonstrate that the particle shape anisotropy has important effects on the structure and dynamics of the glass. The power-law divergence of the static correlation length with exponent -1 suggests that the glass transition is likely a two-dimensional Ising-type critical phenomenon.

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