Tunable Collective Dynamics of Ellipsoidal Quincke Particles

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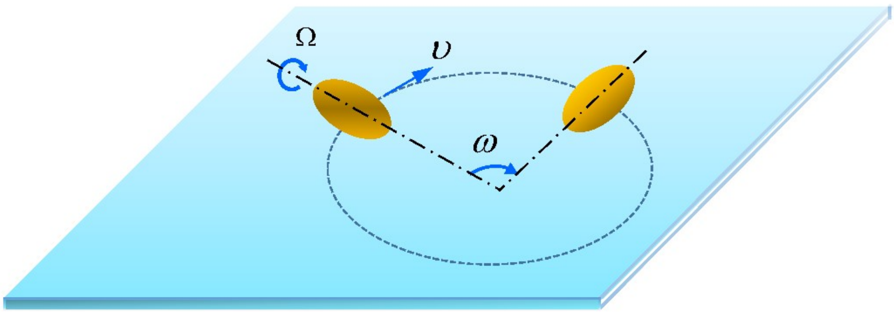
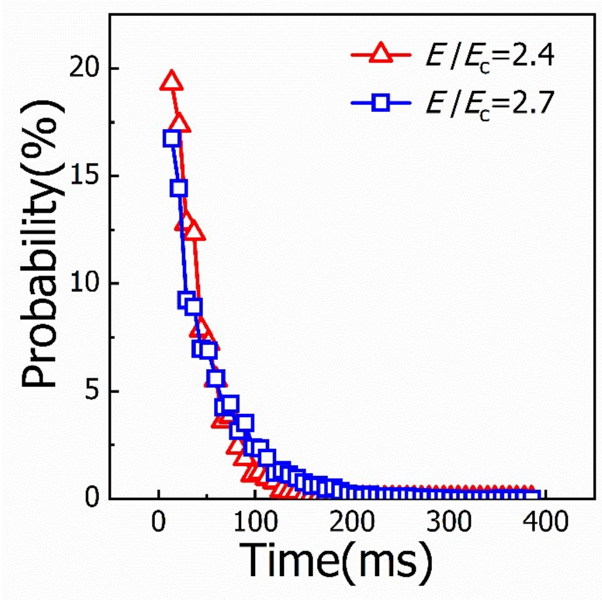
Supplementary Materials

In the unstable spinning state, the tilting of spinning axis leads to the procession of ellipsoidal Quincke particles. Therefore, the speed υ is a result of the combination of spinning and procession as shown in SFig.1. In the absence of procession, the speed υ is linearly dependent on the angular speed Ω of spinning. This linear dependence results in the linear relation between υ^2 and $(E/E_c)^2$. However, the tilting and the procession distort the relation between υ and Ω, giving rise to the deviation from the linear dependence between υ^2 and $(E/E_c)^2$. The larger the tilting angle is, the far the deviation is. The tilting can be suppressed by increasing k or Ω. Therefore, the linear relation between υ^2 and $(E/E_c)^2$ is still well followed at large k and strong field E.



SFig. 1 Motion of ellipsoidal Quincke rollers in the unstable spinning state.



SFig. 2 Reorientation time of ellipsoidal Quincke particles in cluster phases. The aspect ratio k is 2.0. The global area fraction is 0.05.