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Active colloids propelled by induced-charge electrophoresis MING HAN, ERIK LUIJTEN, Northwestern University — Populations of motile organisms exhibit a variety of collective behaviors, ranging from bacterial colony formation to the flocking of birds. Current understanding of these active motions, which are typically far from equilibrium and based on the collective behavior of self-propelled entities, is far from complete. One approach is to reproduce these observations in systems of synthetic active colloids. However, one of the standard self-propulsion mechanisms, induced-charge electrophoresis (ICEP) of a dielectric Janus colloid remains not fully understood by itself, especially the strong dependence of the resultant particle motion on the frequency of the external field. Resolution of this outstanding problem requires detailed study of the time-resolved dielectric response of the colloid and the dynamics of the electric double layer. Through molecular dynamics simulations coupled with an efficient dielectric solver, we elucidate the underlying mechanism of the frequency dependence of ICEP and the polarization of a metallodielectric Janus colloid.

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