

Abstract Submitted
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Dynamic assembly with enhanced ac polarization induced by a conducting microwire HSIEN-HUNG WEI, SHIUAN-FU LIN, TEN-CHIN WEN, National Cheng Kung University — In this work, we design a new microfluidic platform for active manipulation of colloidal suspensions with high-frequency ac electric fields. The strategy invokes a micron-sized metal wire placed under a large conducting plane, acting like a line electrode with an intensified electric field capable of producing strong polarization effects on fluids and suspended colloids. A diversity of polarization phenomena are observed, including rapid dielectrophoretic assembly/segregation of polarized colloids, chaining and clustering due to interactions between these colloids, and dense columning of pearl chains along the wire due to their fluidization by ac electro-osmotic vortices. The underlying physics are also discussed in line with simple scalings that elicit how the phenomena depend on the particle concentration, applied field conditions, and relevant length scales.

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