Movie set 1:

(a) Formation of chains of glass particles (~100 µm diameter) under application of 6 $kVcm^{-1}$ average electric field corresponding to figure 2(*a*). The movie corresponds to the top view of the particles. The experiment was visualized under a microscope at 2.5x and recorded at 500 fps. The movie is played back at 35 fps.

(b) Formation of chains of a mixture of glass particles and Ag-coated amberlite particles under application of 5 $kVcm^{-1}$ average electric field corresponding to figure 2(*b*). The movie corresponds to the top view of the particles. The experiment was visualized under a microscope at 2.5x and recorded at 500 fps. The movie is played back at 35 fps.

(c) Alignment of Ag-coated amberlite particles under application of 5 $kVcm^{-1}$ average electric field corresponding to figure 2(*c*). The movie corresponds to the top view of the particles. The experiment was visualized under a microscope at 2.5x and recorded at 500 fps. The movie is played back at 35 fps.

(d) Alignment of uncoated amberlite particles under application of 6 $kVcm^{-1}$ average electric field corresponding to figure 2(*d*). The movie corresponds to the top view of the particles. The experiment was visualized under a microscope at 2.5x and recorded at 500 fps. The movie is played back at 35 fps.

Movie set 2:

(a) The oscillatory motions of two approximately equal sized Ag-coated amberlite particles of ~550 µm radius each under application of 9 $kVcm^{-1}$ average electric field corresponding to figure 5(*a*). The experiment was visualized under a microscope at 2.5x magnification and recorded at 1000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

(b) The oscillatory motions of two unequal sized Ag-coated amberlite particles with radii of the smaller and bigger particles of ~400 µm and ~550 µm, respectively, under application of 9 $kVcm^{-1}$ average electric field corresponding to figure 5(*b*). The experiment was visualized under a microscope at 2.5x magnification and recorded at 500 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

(c) The oscillatory motions of two approximately equal sized uncoated amberlite particles of ~550 µm radius each under application of 9 $kVcm^{-1}$ average electric field corresponding to figure 5(*c*). The experiment was visualized under a microscope at 2.5x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

(d) The oscillatory motions of two unequal sized uncoated amberlite particles with radii of the smaller and bigger particles of ~400 µm and ~550 µm, respectively, under application of 9 $kVcm^{-1}$ average electric field corresponding to figure 5(*e*). The experiment was visualized under a microscope at 2.5x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

Movie set 3:

(a) The oscillatory motions of a Ag-coated and an uncoated particle with radii of ~550 μm and ~400 μm, respectively, under application of 9 $kVcm^{-1}$ average electric field corresponding to figure 6(*a*). The experiment was visualized under a microscope at 2.5x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

(b) The oscillatory motions of a Ag-coated and an uncoated particle with radii of ~400 μm and ~550 μm, respectively, under application of 9 $kVcm^{-1}$ average electric field corresponding to figure 6(*b*). The experiment was visualized under a microscope at 2.5x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

Movie 4: The movie demonstrates the contact dynamics of two approximately equal sized uncoated amberlite particles of ~550 μm radius each under application of 5 $kVcm^{-1}$ average electric field corresponding to figure 7(*b*). The experiment was visualized under a microscope at 10x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

Movie set 5:

(a) The movie demonstrates the contact dynamics a bigger and a smaller Ag-coated particle with radii of ~550 μm and ~400 μm, respectively under application of 5 $kVcm^{-1}$ average electric field corresponding to figure 8(*a*). The experiment was visualized under a microscope at 10x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

(b) The movie demonstrates the contact dynamics a bigger and a smaller uncoated particle with radii of ~550 μm and ~400 μm, respectively under application of 5 $kVcm^{-1}$ average electric field corresponding to figure 8(*b*). The experiment was visualized under a microscope at 10x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

(c) The movie demonstrates the contact dynamics a bigger Ag-coated and a smaller uncoated particle with radii of ~550 μm and ~400 μm, respectively under application of 5 $kVcm^{-1}$ average electric field corresponding to figure 8(*c*). The experiment was visualized under a microscope at 10x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

(d) The movie demonstrates the contact dynamics a bigger uncoated and a smaller Ag-coated particle with radii of ~550 μm and ~400 μm, respectively under application of 5 $kVcm^{-1}$ average electric field corresponding to figure 8(*d*). The experiment was visualized under a microscope at 10x magnification and recorded at 2000 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.

Movie 6: The simulated movie demonstrates the response of two equal sized particles 1 (top) and 2 (bottom) of 500 µm radius each under application of 9 $kVcm^{-1}$ average electric field for $q_{2t} = 1$ corresponding to figure 9(*a*).

Movie 7: The simulated movie demonstrates the response of two unequal sized particles 1 (top) and 2 (bottom) of radii 500 µm and 400 µm, respectively, under application of 9 $kVcm^{-1}$ average electric field for $q_{1t} = 0.2$ corresponding to figure 10(*b*).

Movie 8: The simulated movie demonstrates an approximate model wherein two equal sized particles 1 (top) and 2 (bottom) of 500 µm radius each and carrying equal and opposite amount of charges move under application of 9 $kVcm^{-1}$ electric field, undergo charge transfer on contact, leading to the reversal of the polarity of their charges and subsequently their direction of motion. This behaviour qualitatively mimics the experimental results obtained with equal sized particles. The colour legend demonstrates the surface charge density in Cm^{-2}.

Movie 9: The simulated movie demonstrates an approximate model wherein a bigger particle of 500 µm radius containing the theoretical value of charge and smaller particle of 400 µm containing the theoretical value of charge of opposite polarity, move under application of 9 $kVcm^{-1}$ electric field. Upon contact, the smaller particle acquires similar magnitude of charge as its initial charge of opposite polarity while the bigger particle acquires 20% of the magnitude of initial charge of opposite polarity. The bigger particle follows the smaller particle very briefly before reversing its trajectory. This behaviour qualitatively mimics the experimental results obtained with unequal sized particles. The colour legend demonstrates the surface charge density in Cm^{-2}.

Movie 10: Rotation of the garland of glass particles under application of 12 $kVcm^{-1}$ average electric field, inside a 400 µm diameter microchannel, corresponding to figure 14(*b*). The arrow indicates the direction of the flow. The experiment was visualized under a microscope at 2.5x magnification and recorded at 50 fps. The movie is played back at 35 fps. The movie corresponds to the top view of the particles.