Process parameters and their relations for the
dielectrophoretic assembly of carbon nanotubes

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Abstract
The selection of process parameters, which include the concentration of the carbon nanotube (CNT) suspension, the magnitude of the applied voltage, and the duration of the electric field, is significant in the assembly of a small number of CNTs across an electrode gap by dielectrophoresis (DEP). This paper investigates by simulation and experimentation these parameter relations. The simulation is based on the effective dipole moment method and considers the DEP force and viscous force on the CNT by the liquid medium. The method can be used to predict the assembly of a CNT originally located at any position within the electric field. The results demonstrate that the assembly time depends on the distance between the CNT and the electrode gap, as well as the magnitude of the applied voltage. Experiments confirm assembly times after recognizing the differences between the simulation and the experimental conditions. The results can help analyze the assembly of CNTs between electric conductors and help select DEP process parameters.

Keywords: carbon nanotubes, electrochemical electrodes, electrophoresis