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**Dielectrophoretic assembly of reversible and irreversible metal nanowire networks and vertically-aligned arrays** STERGIOS J. PAPADAKIS, Johns Hopkins University Applied Physics Laboratory, ZHIYONG GU, Johns Hopkins University Department of Chemical and Biomolecular Engineering, DAVID H. GRACIAS, Johns Hopkins University Departments of Chemistry and Chemical and Biomolecular Engineering — We demonstrate dielectrophoretic control of metallic nanowires in liquid suspensions. By varying parameters including the magnitude and frequency of the applied electric field, the liquid suspending the nanotubes, the nanowire metal, and the flow conditions, we can generate sparse or dense networks, multiply branching or predominately end-to-end networks, and vertically aligned nanowires standing on top of metal electrodes. The networks can be made reversibly or irreversibly. These results demonstrate the applicability of dielectrophoresis in aligning and positioning nanowires, either in the plane of the substrate or perpendicular to it, thereby suggesting a simple and versatile strategy for fabricating a range of integrated devices composed of nanowires. For example, sparse end-to-end networks are promising for individual electronic devices, dense branching networks take advantage of the large surface-to-volume ratio of nanowires for use as sensors, vertically-aligned arrays of nanowires may be used as vertical interconnects in damascene integration of microelectronic devices or in controlling the flow of fluid or light in microfluidic or nanophotonic devices, etc.

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