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Controlled Patterning of Carbon Nanotube Arrays Using Liquids – Toward "Capillography". ELIJAH SANSOM, LYDIA TREVINO, MORTEZA GHARIB, FLAVIO NOCA, California Institute of Technology — We present results of controlled patterning experiments using dense, vertically aligned carbon nanotube arrays ("nanocarpets"). Small amounts of liquids placed on these surfaces result in various micro-scale patterns of rearranged nanotubes. Feature sizes produced range from a few microns for the semi-circular nest patterns to hundreds of microns or more for the trench patterns. Flow effects, evaporation rate dependence (from 8 x 10^{-8} to 3 x 10^{-5} g/cm^2/s), surface tension (from $\sim$20 dyn/cm to $\sim$70 dyn/cm), and properties of the nanocarpet substrates (packing density, nanotube length, adhesion to substrate) are considered along with the patterns they produce. Once made, the patterns are robust to further wetting and evaporation. Using SEM image analysis, the mean size, distribution, and character of the hole and trench patterns are used for comparison between these experiments and others reported in the literature. The typical spread of feature sizes within a sample is about half the mean. This method of patterning nanostructures using liquid-based self-assembly, here termed "capillography," represents a useful nanotechnology and involves rich physical phenomena. Some potential applications are in surface drag reduction, field emission displays, thermal management, and cellular tissue growth substrates.

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