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Polymer crystallization-driven, periodical patterning on carbon nanotubes LINGYU LI, CHRISTOPHER LI, Drexel University — We report herein a unique means to periodically pattern polymers on carbon nanotubes (CNTs) using controlled polymer crystallization method. CNTs were periodically decorated with polymer lamellar crystals, resulting in nano hybrid shish-kebab (NHSK) structures. The periodicity of adjacent kebabs varies from 20 - 150 nm. The kebabs are approximately 5 nm thick (along CNT direction) with a lateral size of $\sim$ 20 nm to micrometers, which can be readily controlled by varying crystallization conditions. Both polyethylene and Nylon 66 were successfully decorated on single-walled carbon nanotubes (SWNT), multi-walled carbon nanotubes (MWNT), as well as vapor grown carbon nanofibers (CNF). The formation mechanism was attributed to "size dependent soft epitaxy". NHSK structure was discussed with an emphasis on the periodicity of adjacent kebabs. The influence of experimental parameters on the periodicity was investigated in details Since NHSK formation conditions depend upon CNT structures, it further provides a unique opportunity for CNT separation. The reported method opens a gateway to periodically patterning polymers and different functional groups on individual CNTs in an ordered and controlled manner, an attractive research field that is yet to be explored.

Lingyu Li
Drexel University

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