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Band structure engineering of graphene by a local gate defined periodic potential CARLOS FORSYTHE, PATRICK MAHER, DIEGO SCARABELLI, CORY DEAN, Columbia University, PHILIP KIM, Harvard University — Recent improvements in 2-dimensional (2D) material layering have resulted in enhanced device quality and created pathways for new device architectures. We fabricate periodic arrays from a patterned local back gate and a uniform top gate on hBN encapsulated graphene channels. The symmetry and lattice size of the periodic potential can be determined by state-of-art electron beam lithography and etching, achieving a lattice constant of 35 nm. The strength of the electric potential modulation can be controlled through applied voltage on the patterned gate. We observe signatures of superlattice modulation near the main Dirac peak in the density dependent resistance measurement at zero magnetic field. Current studies focus on the exploration of Hofstadter fractal band structures under magnetic fields. Our nano-patterned engineered superlattices on graphene hold great promise for wider applications.

Carlos Forsythe
Columbia University

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