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Block Copolymer Directed Self-Assembly Approaches for Doping Planar and Non-Planar Semiconductors. BHOOSHAN POPERE, Univ of California - Santa Barbara , BORIS RUSS, Univ of California - Berkeley, ANDREW HEITSCH, The Dow Chemical Company, PETER TREFONAS, Dow Electronic Materials, RACHEL SEGALMAN, Univ of California - Santa Barbara — As electronic circuits continue to shrink, reliable nanoscale doping of functional devices presents new challenges. While directed self-assembly (DSA) of block copolymers (BCPs) has enabled excellent pitch control for lithography, controlling the 3D dopant distribution remains a fundamental challenge. To this end, we have developed a BCP self-assembly approach to confine dopants to nanoscopic domains within a semiconductor. This relies on the supramolecular encapsulation of the dopants within the core of the block copolymer (PS-*b*-P4VP) micelles, self-assembly of these micelles on the substrate, followed by rapid thermal diffusion of the dopants into the underlying substrate. We show that the periodic nature of the BCP domains enables precise control over the dosage and spatial position of dopant atoms on the technologically relevant length scales (10-100 nm). Additionally, as the lateral density of 2D circuit elements approaches the Moore's limit, novel 3D architectures have emerged. We have utilized our BCP self-assembly approach towards understanding the self-assembly our micelles directed by such nanoscale non-planar features. We show that the geometric confinement imposed by the hard feature walls directs the assembly of these micelles.

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