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Block copolymer templated growth of ZnO nanorod arrays with controlled size and spatial density CANDICE PELLIGRA, CHINEDUM OSUJI, Yale Univ — The ability to control the diameter and spatial density of substrate-supported ZnO nanorods is critical for leveraging these nanomaterials in emerging applications. Specifically, in polymer-based photovoltaics (PV), there is a need to fabricate ZnO arrays with control over nanorod diameter and spacing to optimize device active area and to maximize exciton harvesting by matching the nanorod spacing to the exciton diffusion length in the polymer matrix. Self-assembly of block copolymers (BCPs) is well-suited to ordering nanoscopic domains over macroscopic areas with high levels of control in a low-cost, scalable manner. We present here a simple and robust method for templating the growth of vertically oriented ZnO nanorods with controlled diameter and spatial density based on the self-assembly of close-packed BCP micelles on pre-seeded substrates. Templating is accomplished using a wide range of BCP molecular weights and compositions to provide control of the ultimate nanowire diameter and areal density, respectively. Because the method relies on selective infiltration of nanorod precursor species through a hydrophobic micelle corona, it is readily extensible to a wide variety of block copolymers and nanomaterials.

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