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Review

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**An engineering insight into block copolymer self-assembly: Contemporary application from
biomedical research to nanotechnology**

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Abstract

Because of their unique ordered structures, block copolymers (BCPs) are known to form a broad range of morphologies (e.g., cylinders, vesicles, spheres, and lamellae). These types of assemblies can be utilized for various potential and practical applications in numerous fields including nanotechnology. This review addresses classification of different BCPs based on polymeric moieties and arrangement of polymer chains present in their structure. Discussion is focused on some physicochemical characteristics of BCP micelles in aqueous media. Beneficial features of BCP self assembly in the generation of nanostructures are comprehensively reviewed. Potential applications of BCP-drug conjugates have been described with numerous case studies. Successful implementation of BCP self-assembly in modern age research of nanoporous ultrafiltration membrane, nanolithography, functionalized nanomaterial preparation has been overviewed with mechanistic details. Finally, we offer a brief perspective on the future opportunities of BCPs in diverse research fields.

Key words: Block copolymer; Self-assembly; Drug Delivery; nanoporous membrane; Nano-object; Nanolithography

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