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Chemically and Electrically Tunable Block Copolymer Photonic Gels: Exceptionally Large Tunability via Uniaxial Swelling YOUNGJONG KANG, JOE WALISH, TARAS GORISHNYY , EDWIN L. THOMAS, MIT — Many potential applications of photonic band gap (PBG) materials have been limited by their insufficient tunability and sensitivity as well as their difficulty of fabrication. Self-assembly of block copolymers could provide an unraveling route for addressing these problems. Here we report the preparation of chemically and electrically tunable PBG materials from self-assembly of PS-*b*-P2V. Because of the unique meso-lamellar gel structures, where the swellable P2VP gel layers are bound on the glassy PS layers, our photonic gels expand only uniaxially normal to the substrate, and which gives extremely large tunability from UV-VIS to NIR region. Using the osmotic deswelling, we demonstrate dynamically and reversibly tunable photonic gels in aqueous salt solution. We also demonstrate the electrical tunability for the same system by using electrophoretic control of domain spacing. We anticipate our material can be applicable to many novel applications including an active component of display devices, electrically tunable lasers, and electrically controlled photonic switches.

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