

Characterizing Block Copolymers for Directed Self Assembly Using Soft X-rays

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The directed self assembly (DSA) of block copolymers (BCPs) is being researched as a potential lithographic enhancement technique. This technique is implemented by aligning a thin film of BCP on top of a guiding template, where the template spacing is larger than the BCP. This approach has the potential to amplify the template spacing to length scales that cannot be mass produced with optical lithographic techniques. One of the most significant challenges in the field is characterizing the internal structure of the DSA BCP films, which typically very thin (< 100 nm) and consist of materials with small differences in electron density. This presents an excellent opportunity for the use of soft X-rays, where the contrast can be tuned by varying the energy near an atomic absorption edge. By combining soft X-rays with critical dimension small X-ray scattering (CDSAXS) the internal structure of the films can be reconstructed. Using this technique we will examine how changing the parameters of the DSA process can impact the internal morphologies of DSA BCP films.