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Using Block Co-Polymers to Create a Metal Oxide Hard Mask for Etching Silicon and Silicon Dioxide OMAR CERVANTES, Hartnell Community College, LUIS CASTRO, UC Santa Cruz, NOEL ARELLANO, IBM Almaden Research Center — Moore's Law has been achievable using lithography techniques for decades. However, lithography techniques are getting more expensive and difficult due to the wavelength of light and the limitations of optical systems currently used to pattern transistors. Our proposal involves using block-copolymers (BCP) to create the patterns necessary to achieve a line width which defines the critical dimension of a transistor. BCP have been shown to create patterns with line widths around 10 to 14 nanometers. Our specific internship goal was to develop an etch-resistant metal oxide mask defined by a lamellae BCP pattern. We began the process by creating fingerprint BCP patterns using spin casting techniques on surface of a silicon or silicon dioxide wafer. Then, we removed one of the polymers after they have self-assembled using an oxygen plasma etch. After, the empty space was filled with a metal oxide using an atomic layer deposition (ALD) tool. Next, we removed the top layer of metal oxide to reveal the remaining polymer block. Finally, we remove the remaining polymer block leaving behind the metal oxide mask. This allowed us to selectively etch into the silicon or silicon dioxide. This technique can achieve spacing smaller than being used today.

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