

Refining the Fabrication of Grayscale Lithography Annealed Resin Engineering

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Grayscale Lithography by Annealed Resin Engineering (GLARE) is a method used to develop grayscale photolithography masks through pyrolysis of grayscale resists. The process then converts the polymer patterns from the gray scale mask into a carbon mask with various thicknesses. Ultimately, this new carbon mask allows various amounts of light to transmit through depending on the thickness of the carbon, thereby developing unique patterns at very low cost and at a fraction of the time compared to traditional methods. Although this new photolithography method is quite promising, little is known of the development processes from a true fabrication standpoint of the development processes. Here, we present insight into tuning the development process by using the pyrolyzed carbon mask on both AZ-4330 and ma-P 1275G photoresists. By comparing how the various features develop through the GLARE mask in both photoresists, this can give insight into building a robust development process by understanding what key fabrication parameters need to be tuned to dial in our lithography process. Ultimately, the insight that this study provides will further help engineers in using GLARE in future processing of next-generation technologies.

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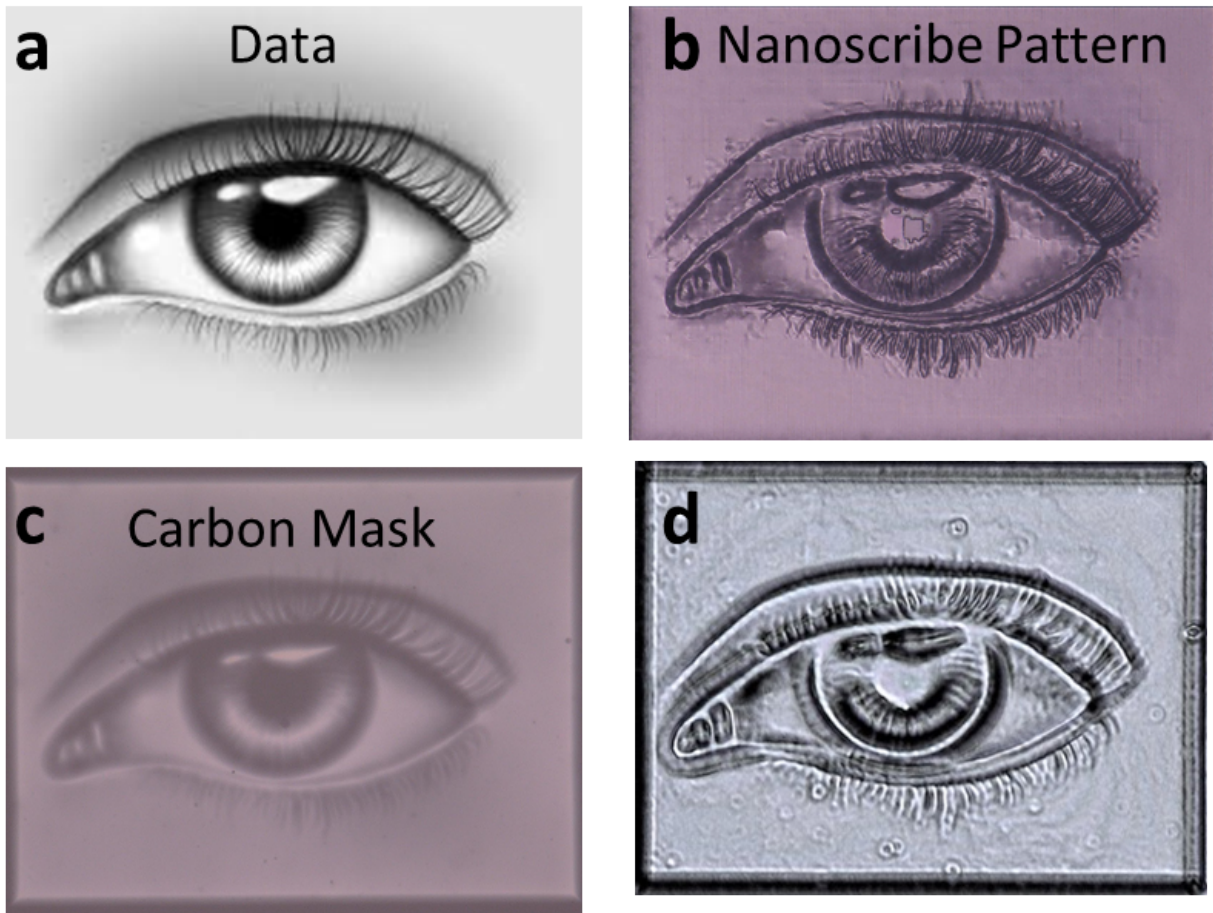


Figure 1: Grayscale Lithography by Annealed Resin Engineering (GLARE) procedure in using a Nanoscribe to develop the pattern of the carbon mask where is then used to result in Gray-Scale Lithography pattern.