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**Sample topography measurements by a novel image processing algorithm** BRYANT AARON, DAN TAMIR, Department of Computer Science, JAVAD R. GATABI, WILHELMUS GEERTS, Department of Physics, R.K. PANDEY, Department of Electrical Engineering, Texas State University at San Marcos — An exposure tool for lithography on non-flat samples is being developed. The pattern is directly written in a photoresist plated sample by moving the sample under a focused laser beam. During the writing process the topography of the surface is measured and a parametric model of the 3D surface is generated to allow for corrections of the exposure dose, the focus, and the direction of the light incident upon the sample. The system uses image processing techniques for estimating the distance of points on the surface to the objective. An illumination pattern consisting of four squares is projected on the surface of the sample. Images are taken with a high speed SCMOS camera. The topography of the sample is estimated from the measurements of the contrast around the projected patterns. To determine the contrast the k-means algorithm with k=2 is applied. The algorithm groups pixels into two clusters and the contrast is determined from average pixel values in high (u) and low intensity (v) clusters using (u-v)/Max; where max is the maximum pixel value detected in the image. Slope and focus quality are determined from the measured contrast values. The authors would like to thank NSF for financial support (grant: 0923506).

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