Warpage Measurement of Diamond Coated Grinding Wheel by Shadow MoirAC

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Summary

Chemical mechanical planarization (CMP) process flattens the wafer by polishing it against a rotating pad. During the polishing process, a diamond coated grinding wheel must be frequently employed to remove the accumulated debris lest the polishing surface glazes. To assure the flatness of polished wafers during the CMP process, the surface warpage of the diamond grid dresser surface must be small enough. In this study, phase-shifted shadow moirAC method was employed to measure the surface profile of diamond grinding wheel, and the warpage was determined by LSM (lease-squares surface method). Since the impinging light may either be reflect directly or be blocked to the CCD by the diamond coated abrasive particles on grinding wheel, bright and/or dark spots stemmed on the phase-shifted images will cause the Macy phase unwrapping process to fail. To solve this problem, a novel method is proposed by setting a threshold from the average grey-level value of the four phase-shifted images, and a threshold from the grey-level difference between the average of two images with phase 0, and the average of other two images with phase i/2 and 3i. After the erroneous bright and dark spots was found and substituted by neighborhood averaging, the phase was successfully unwrapped by a modified Macy phase unwrapping method. Tests of the proposed method on a real specimen is presented. The results show that the bright and dark spots can be effectively identified and the phase can be unwrapped successfully to obtain the surface warpage of the specimens.