

Could a Die Be Disposable?

-- Design and Test of a Silicon-Wafer-Based Slot Die Coater

An-Bang Wang, Yu-Wen Hsieh, Yu-Ju Liu, and Tzu-Yao Lin

Institute of Applied Mechanics
National Taiwan University, Taipei, Taiwan 10617 ROC

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Abstract

Die is costly. The needs of high-precision manufacturing and wide-ranged applications design are two major causes for increasing cost and complexity for the conventional slot die coater to offer good flow uniformity at its outlet. To efficiently reduce the cost and increase the design flexibility of the coating die, we proposed a brand-new and simple design concept and tested it in this paper. This newly proposed slot die coater is made of commercially available standard material, i.e., silicon wafer and glass sheet, and manufactured by using standard method, i.e., microelectromechanical systems (MEMS) technology, rather than special material, like stainless steel blocks, and by conventional high-precision machining. Due to the ultra-low surface roughness of silicon wafer and glass, the plane polish processes can be almost completely neglected and thus the manufacturing cost is drastically reduced. The design flexibility of die can be also significantly enhanced due to the easy patterning of complex geometry by MEMS manufacturing process. The performance of a new silicon-wafer-based coater was tested for multi-layer ceramic capacitor (MLCC) fabrication to demonstrate its use. The fabrication process and the assembly of the coater are shown in Fig.1(a) and Fig.1(b), respectively.

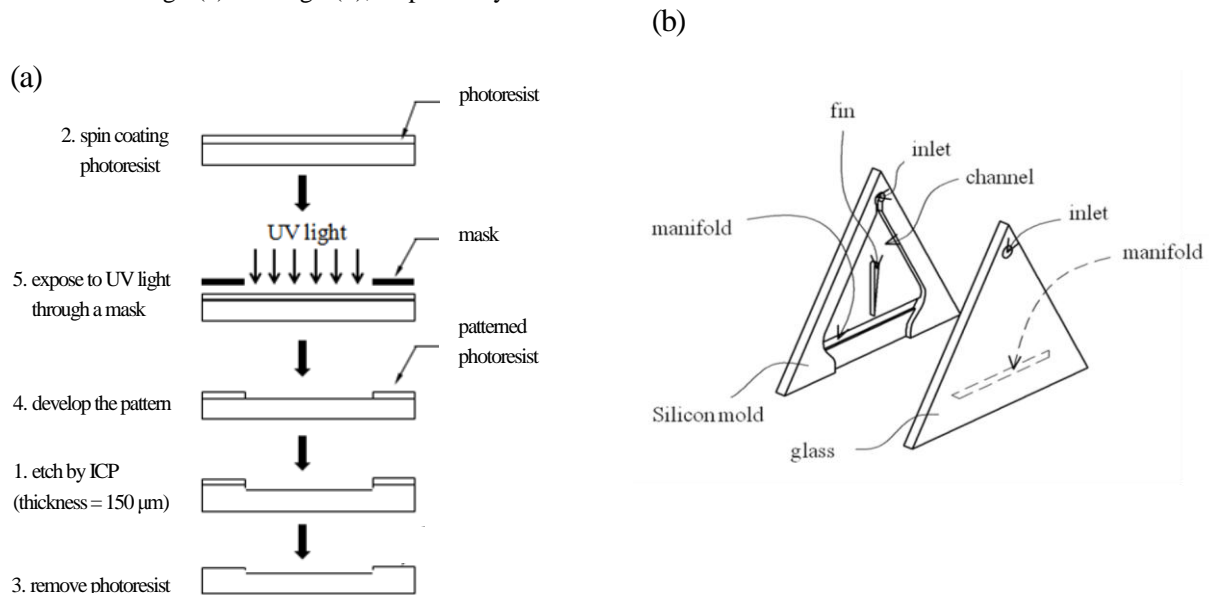


Fig.1 (a) fabrication process of the silicon mold (b) the assembly of the silicon-wafer-based slot die coater

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