

Moving Mask Direct Photo-Etching (M²DPE) for 3D Micromachining of Polytetrafluoroethylene

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Abstract

Three dimensional microfabrication of polytetrafluoroethylene was carried out by applying moving mask technique to synchrotron radiation direct photo-etching. Firstly, basic experiments to determine the dependence of processed depth and surface roughness on several parameters such as beam current, exposure time and substrate temperature were carried out. Increase in beam current, exposure time and substrate temperature realized improvement of surface roughness as well as processed depth. Because of strong dependence of processed depth on the several parameters, the dose defined by product of beam current and exposure time was hardly applied for the control of processed depth. As test structures of 3D microfabrication by moving-mask, conical microstructures were successfully fabricated and the possibility of flexible 3-D micromachining of polytetrafluoroethylene was demonstrated.

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