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(54) **HIGH BRIGHTNESS - MULTIPLE BEAMLETS SOURCE FOR PATTERNED X-RAY PRODUCTION**

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(57) **ABSTRACT**

Techniques for controllably directing beamlets to a target substrate are disclosed. The beamlets may be either positive ions or electrons. It has been shown that beamlets may be produced with a diameter of 1 μm, with inter-aperture spacings of 12 μm. An array of such beamlets, may be used for maskless lithography. By step-wise movement of the beamlets relative to the target substrate, individual devices may be directly e-beam written. Ion beams may be directly written as well. Due to the high brightness of the beamlets from extraction from a multicusp source, exposure times for lithographic exposure are thought to be minimized. Alternatively, the beamlets may be electrons striking a high Z material for X-ray production, thereafter collimated to provide patterned X-ray exposures such as those used in CAT scans. Such a device may be used for remote detection of explosives.

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