Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Generation and regulation of multiple focuses by tight focusing of patterned vector optical field array CHENGHOU TU, MENGQIANG CAI, HUIHUI ZHANG, SHENGXIA QIAN, YONGNAN LI, HUI-TIAN WANG, Nankai Univ., Tianjin, OPTICAL FIELD REGULATION TEAM — We have numerically studied the tight focusing of patterned vector optical field array based on the modified Richard-Wolf diffracting integration. By tailoring the spatial arrangement and the polarization distribution of the individual vector optical field, sub-wavelength multiple focal spots with different arrangement can be easily realized. The size of the focal spots, the distance between different focal spots and the arrangement of focal spots can all be regulated by varying the parameters of VOFs. Focal spots with the arrangement of hexagon, rectangle or rhombus can be obtained depending on the different setting conditions of PVOF. To check the numerical results, we experimentally generated the PVOFs according to the numerical conditions, and utilize the tightly focused optical fields to ablate the single crystal silicon wafer surface. Based on SEM images of the ablated sample surface, we find that the experiment results, which indirectly measured the intensity distribution and the size of the focal spots, agree with the numerical results very well. The tight focusing of PVOF opens a new window for regulating the focal intensity distribution due to the control diversity. As a result, it can be very flexible and helpful in many applications, such as micro-nano parallel fabrication and optical manipulation, etc.

Chenghou Tu
Nankai Univ., Tianjin

Date submitted: 13 Nov 2013 Electronic form version 1.4