

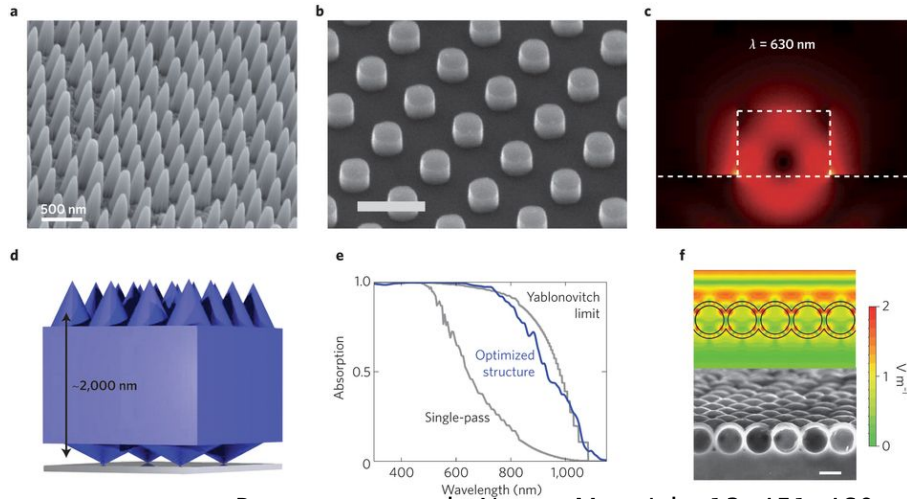
Holith HoliMatrix Holographic Nanopatterning Platform

全息纳米图案化平台



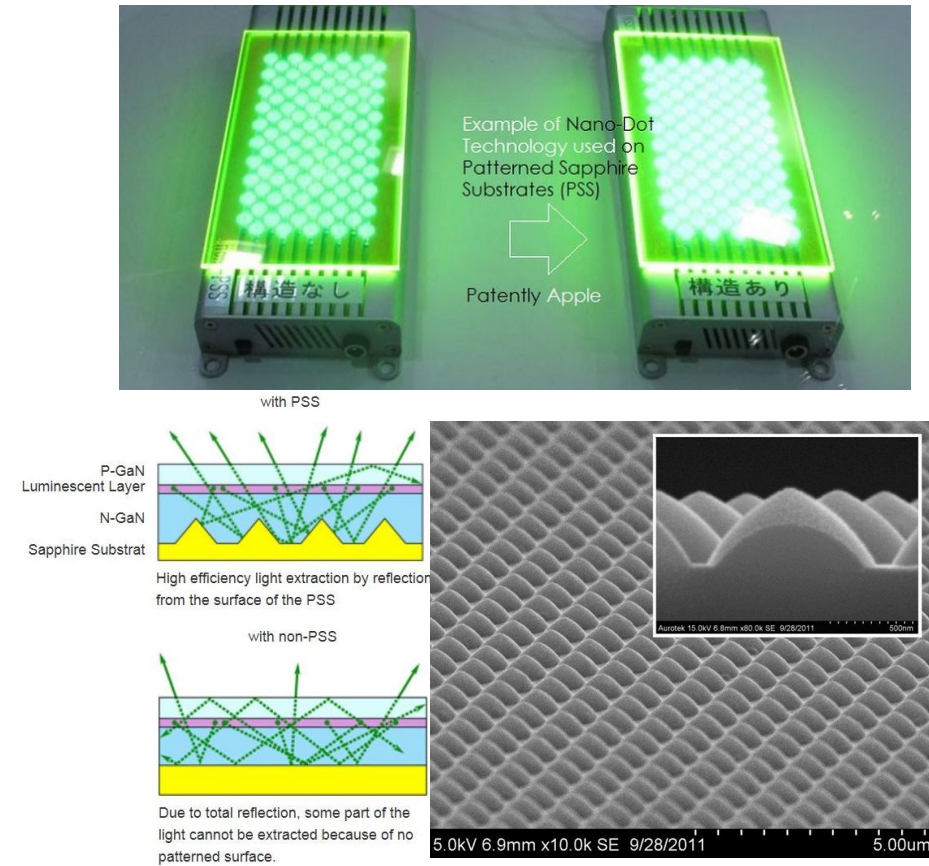
大面积纳米结构在现代纳米器件制造中的需求

Solar cells: enhanced light absorption

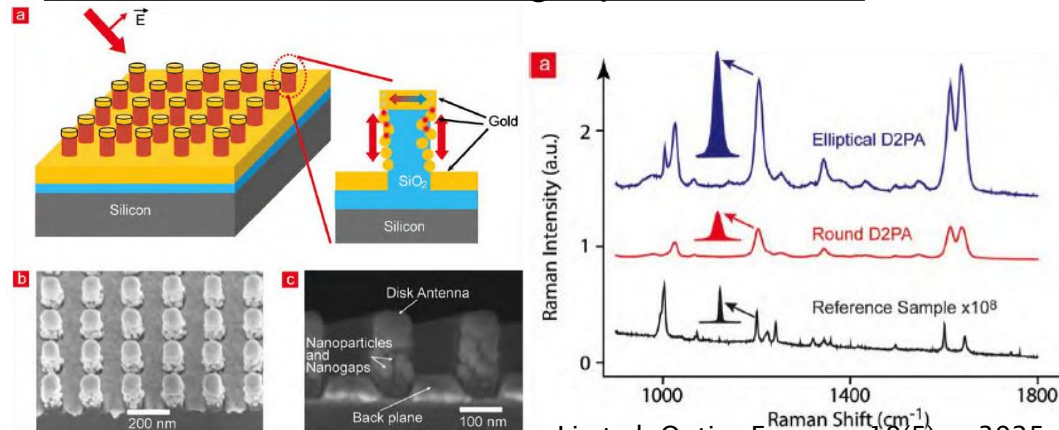


Brongersma et al., Nature Materials, 13, 451–460, 2014

LED: light extraction by nanostructures



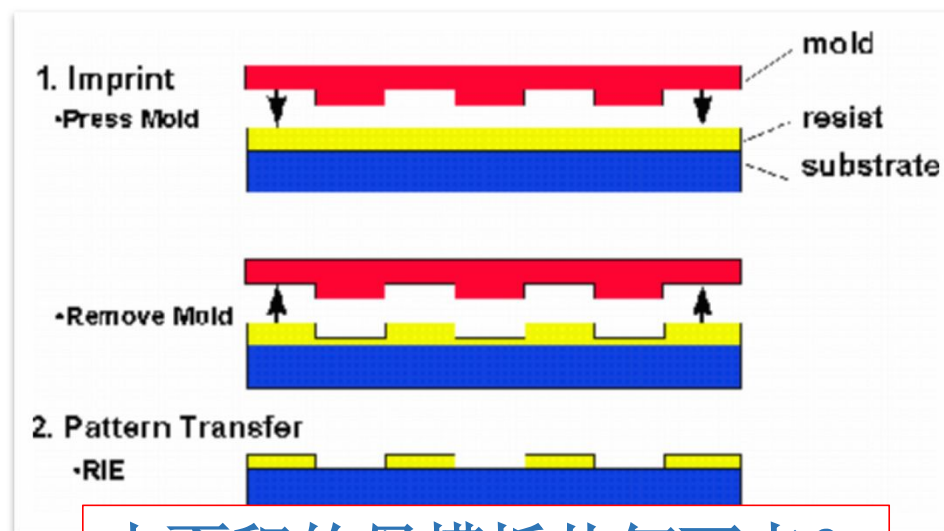
Surface-enhanced sensing: optical antenna



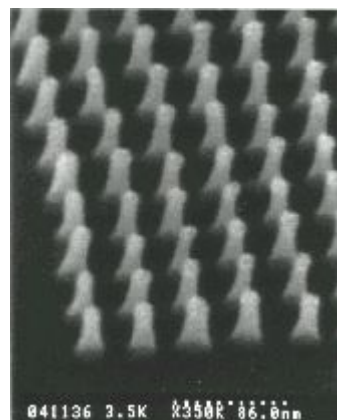
Li et al, Optics Express, 19(5), p.3925, 2011

大面积纳米图案的制作对纳米器件的研究和发展至关重要

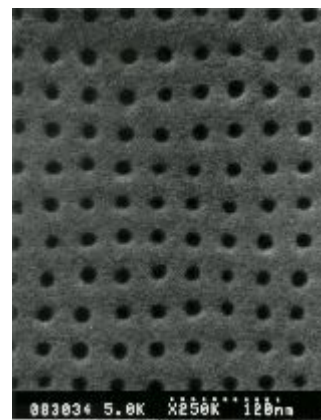
大面积纳米图案化结构的方法——纳米压印“伴侣”



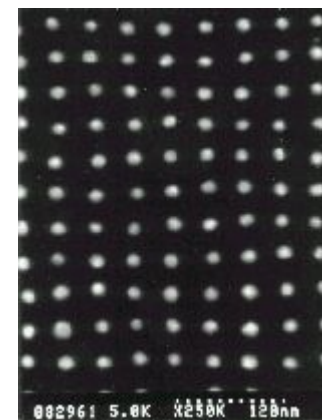
大面积的母模板从何而来？



Imprint mold with
10nm diameter pillars



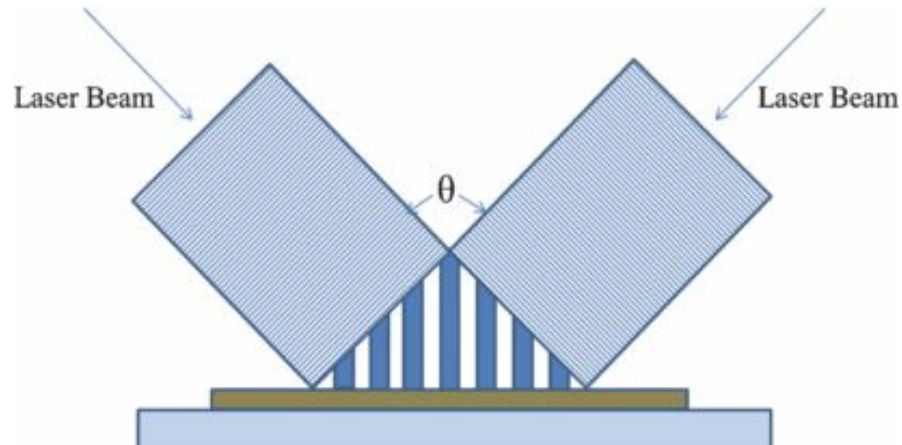
10nm diameter holes
imprinted in PMMA



10nm diameter metal
dots fabricated by NIL

大面积图案化制作原理-干涉光刻（及常见问题）

Fringes generated through interference

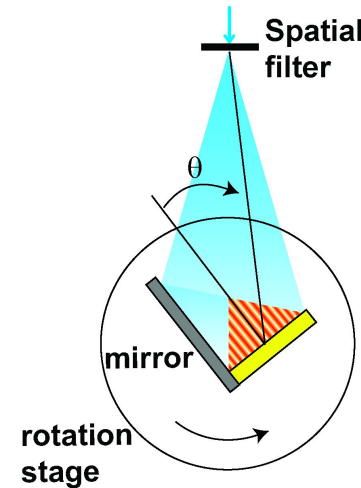


$$\text{Periodicity } (\Lambda) = \frac{\text{Wavelength } (\lambda)}{2 * \sin\left(\frac{\theta}{2}\right)}$$

For 351 nm laser, achievable period ~ 190 nm

For 405 nm laser, achievable period ~ 220 nm

Simplest interference lithography: Lloyd's setup (wavefront-splitting)

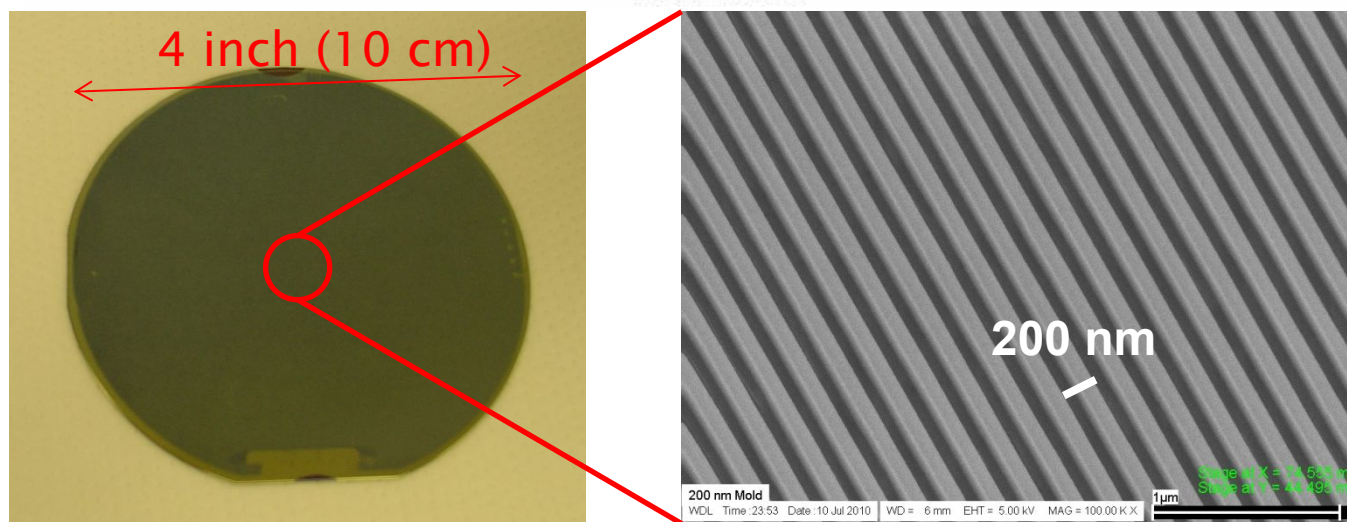
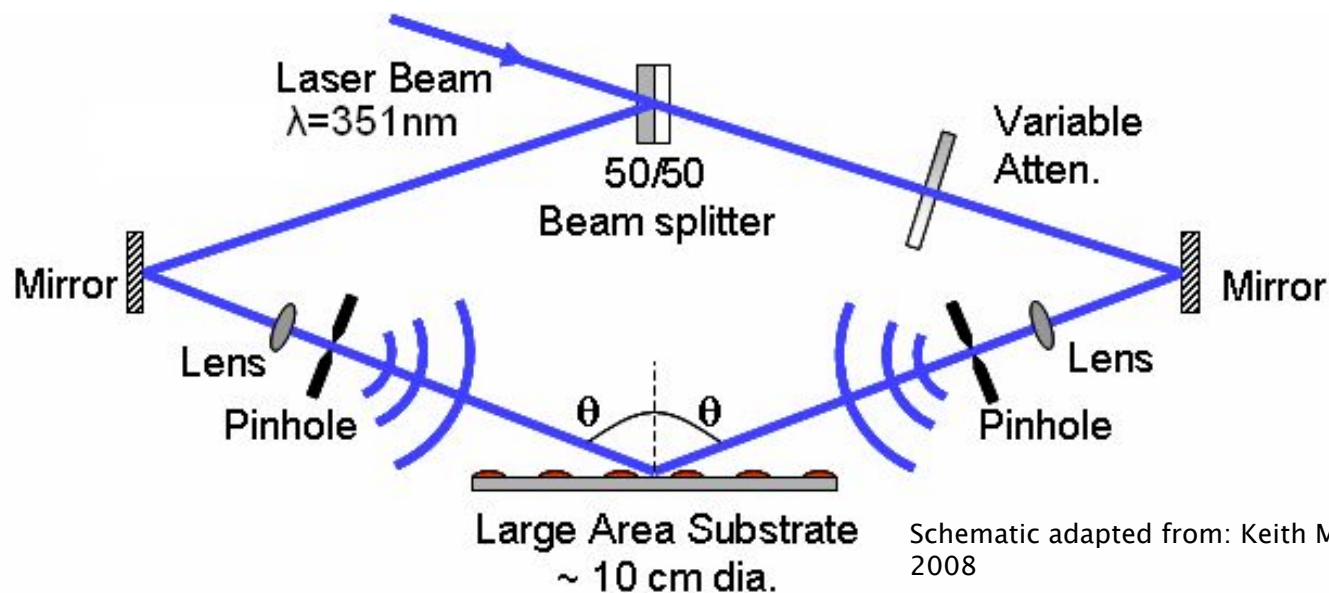


Disadvantages:

- ❖ Mirror quality is important for fine high-quality gratings;
- ❖ Difficult to achieve large area patterns due to limitation of mirror size;
- ❖ Asymmetric paths of the two interfering beams.

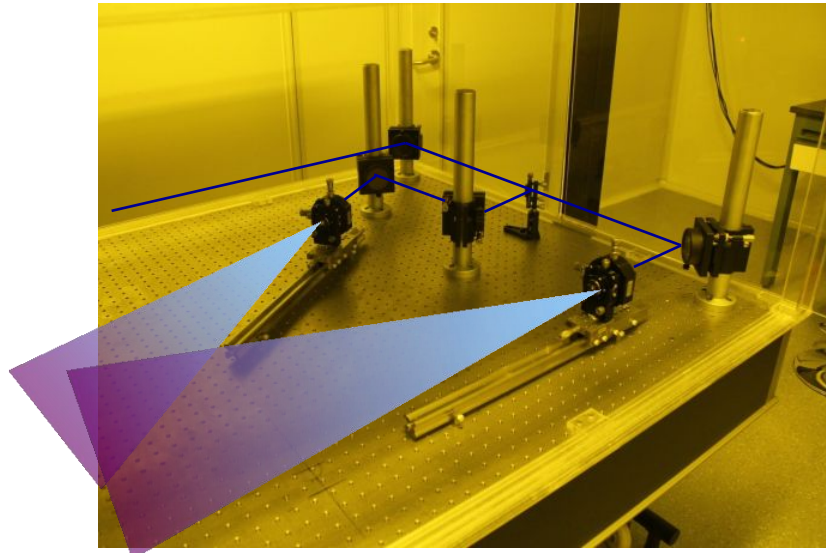
更好的干涉光刻技术体系 --- 振幅分割建立

振幅分割干涉光刻原理图

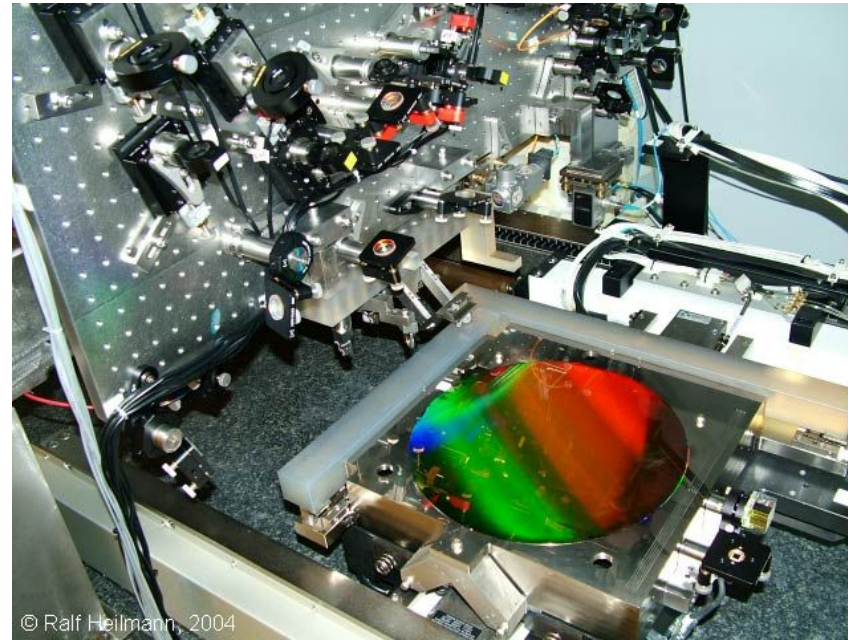


双光束干涉纳米图案化结构制作商业化难点与现状

Simple laboratory two-beam setup

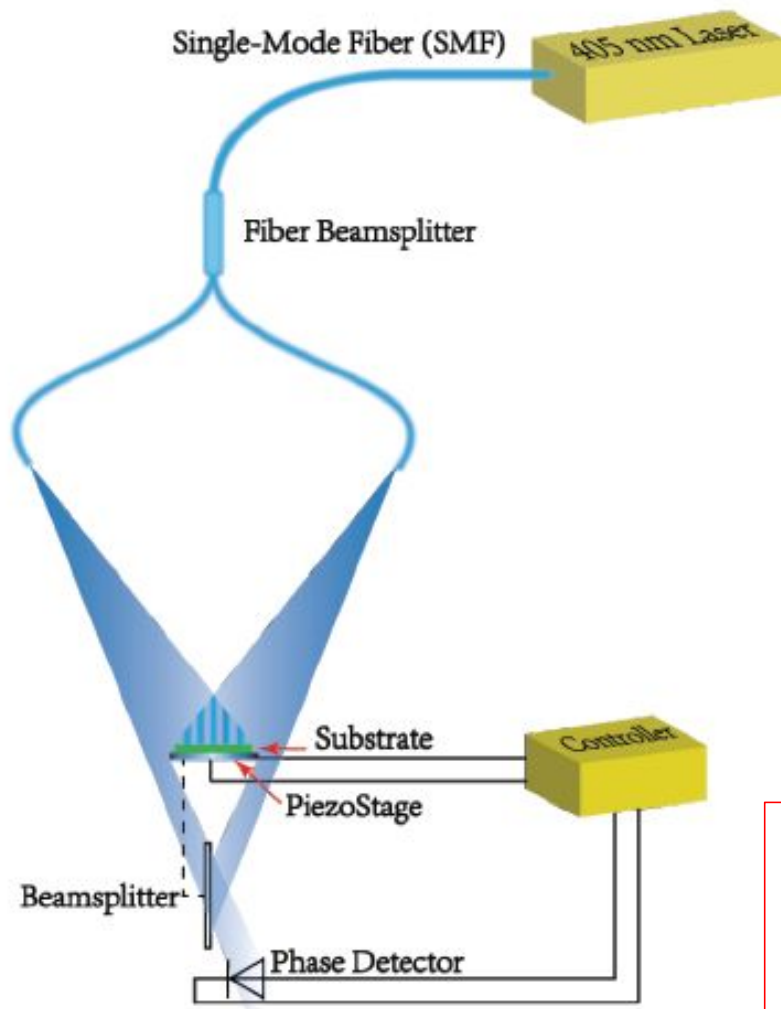


Most advanced two-beam setup at MIT



- Free-space optics: bulky, expensive, delicate, vibration-sensitive
- Highly skill-demanding for optical alignment (not practical for most nanodevice researchers)
- Re-alignment required when patterning new nanostructures

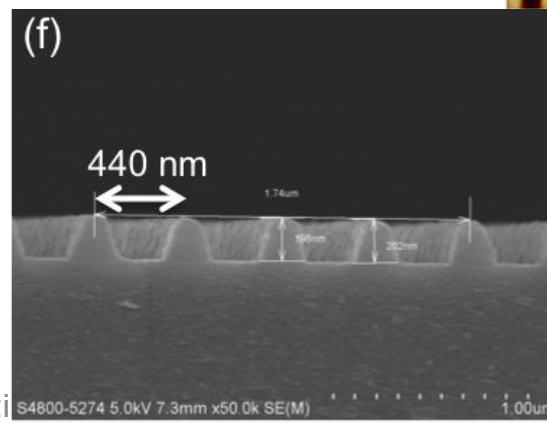
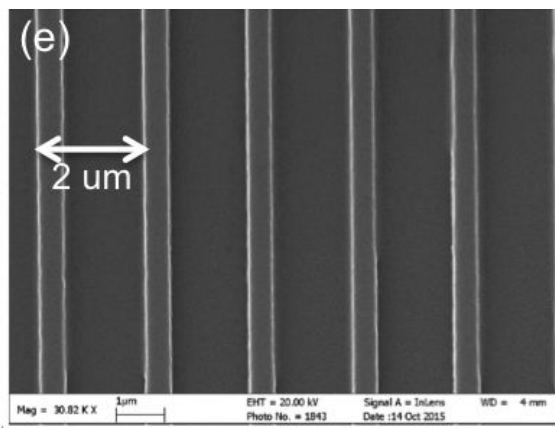
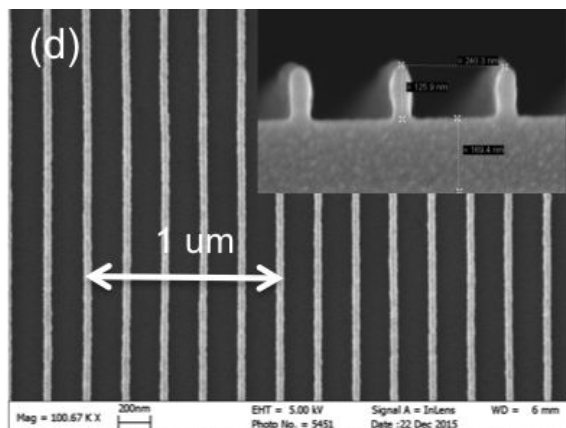
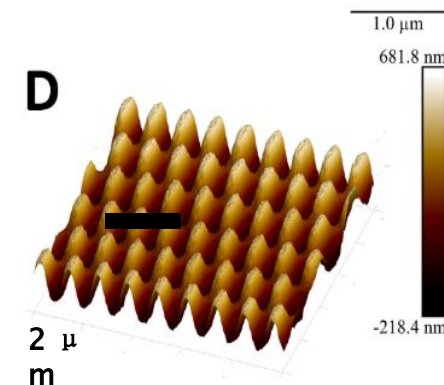
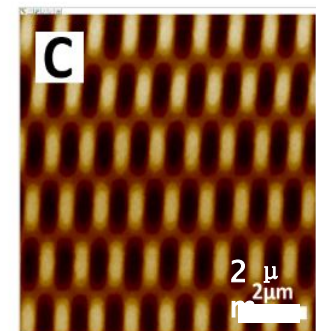
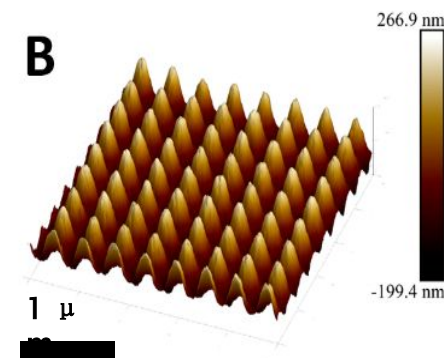
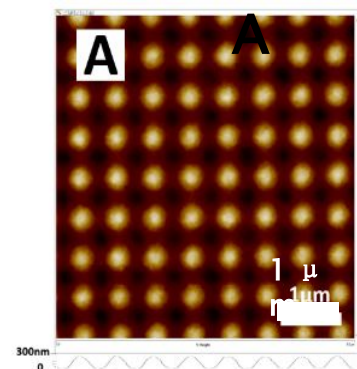
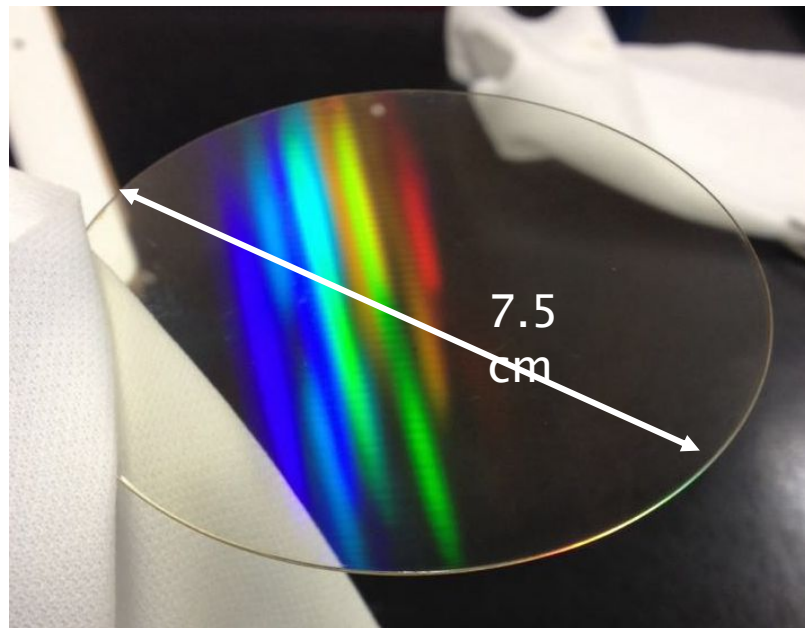
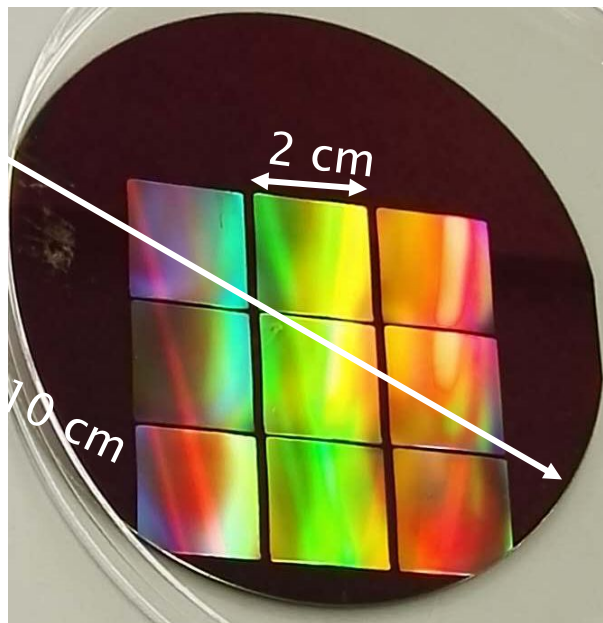
多功能、简便干涉商业化平台解决方案



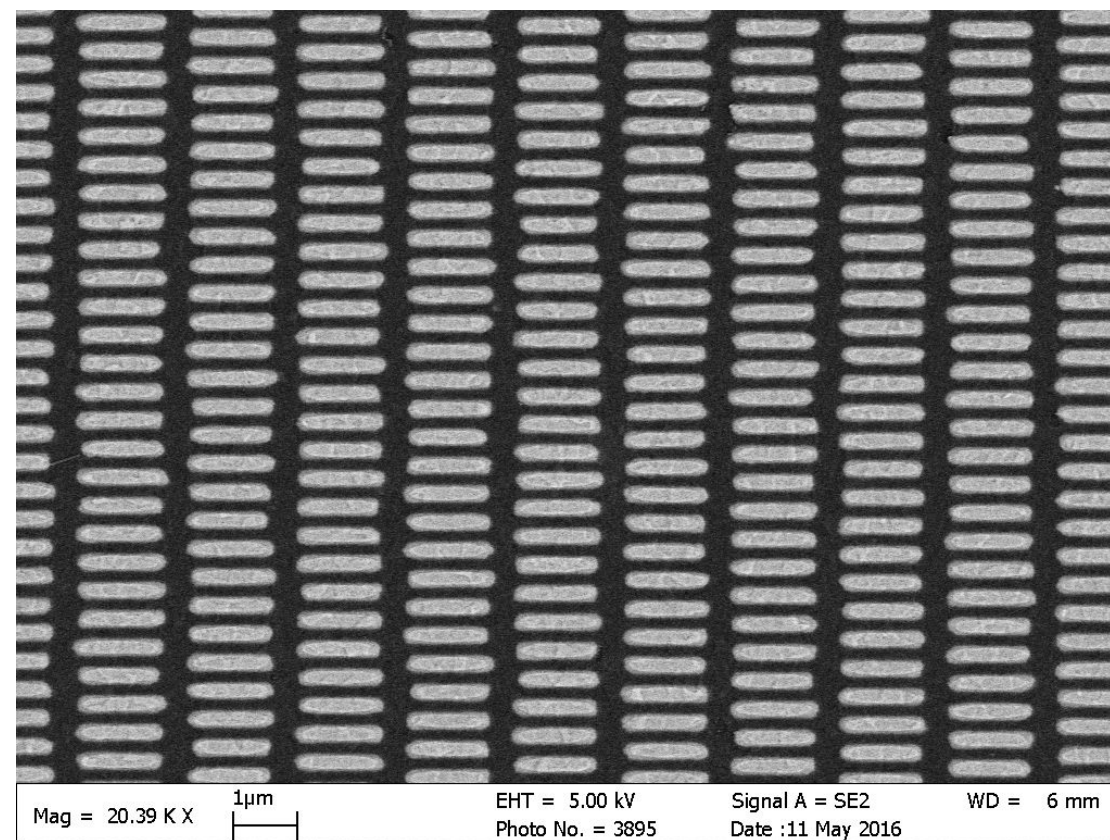
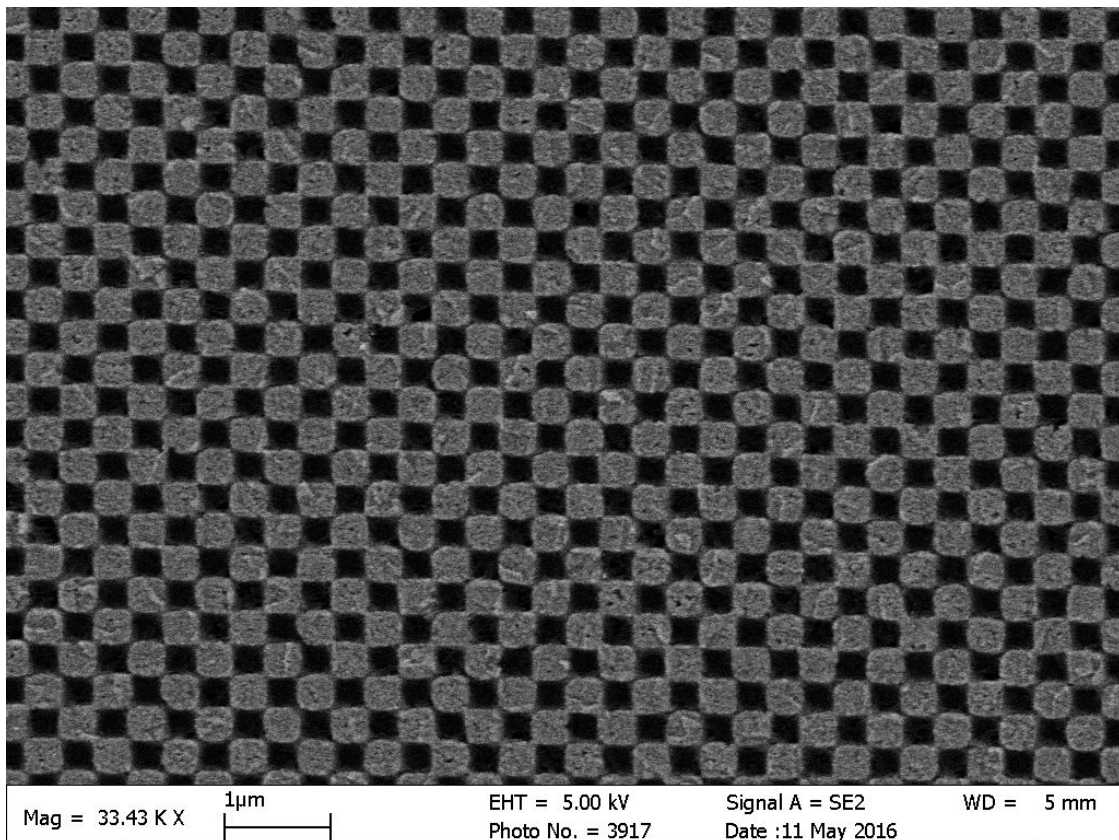
- All-fiber-optic setup replacing free-space optical components
- Special optical fiber delivers light from laser
- Fiber-optic beam splitter splits the laser beam into two coherent beams
- Output port of the fiber performs spatial filtering
- Close-loop feedback control stabilizing interference pattern

- 低成本、不受环境因素干扰
- 自动化成为可能：自由改变入射角度调整模式周期

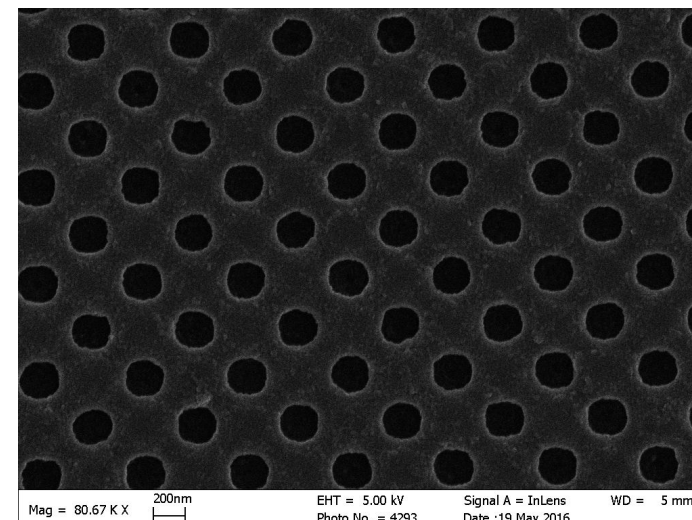
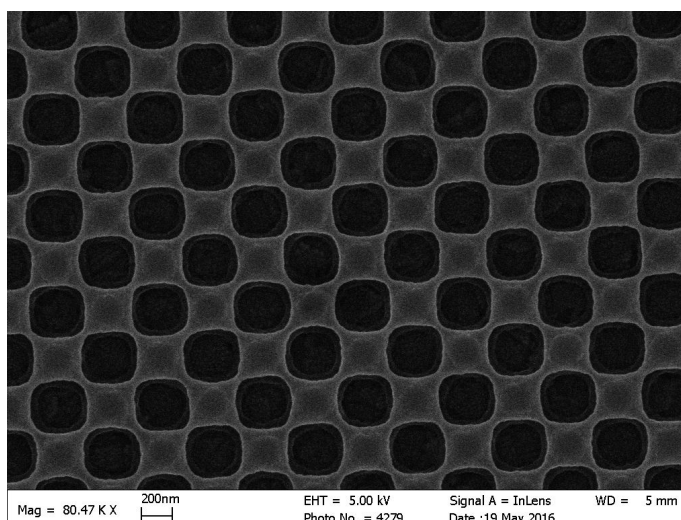
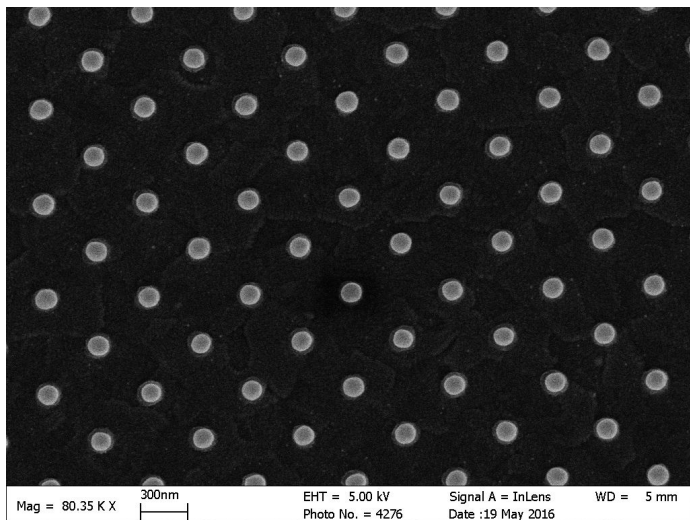
Holith纳米图案化结构



Holith纳米图案化结构-金属模板



Holith纳米图案化结构-点阵结构



- 点阵周期250nm-1um, l两端可扩展
- 可实现一片多种结构复合
- 技术可实现大而圆, 可咨询指导加入其它加工方法辅助
- 更多结构等您扩展

Holith 与市场上常见高分辨率纳米级图案制作比较



	Our Product	Eulitha PhableR 100	SVG
Resolution (half-pitch)	115 nm	150 nm	< 125 nm?
Demonstrated minimum feature size	<100 nm	150 nm	?
Mask or maskless	Maskless	Need a mask	Maskless
Cost (list price)	USD 230k	EUR 250k	?
Pattern versatility	Easy and fast adjustment	Fixed by the mask	Difficult to change

低成本、更灵活多样的纳米图案制作，为学校、科研带来更多选择，10年的研发制作经验，和您拓展更多的技术应用！

