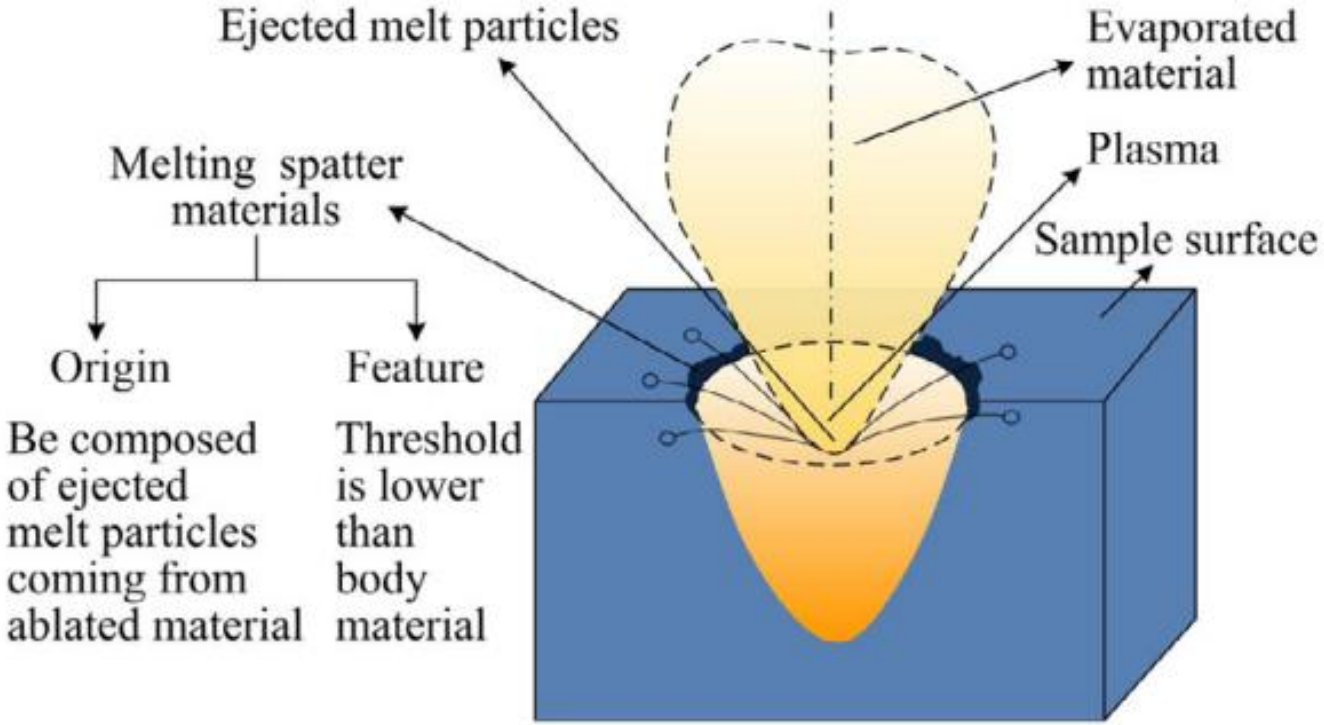
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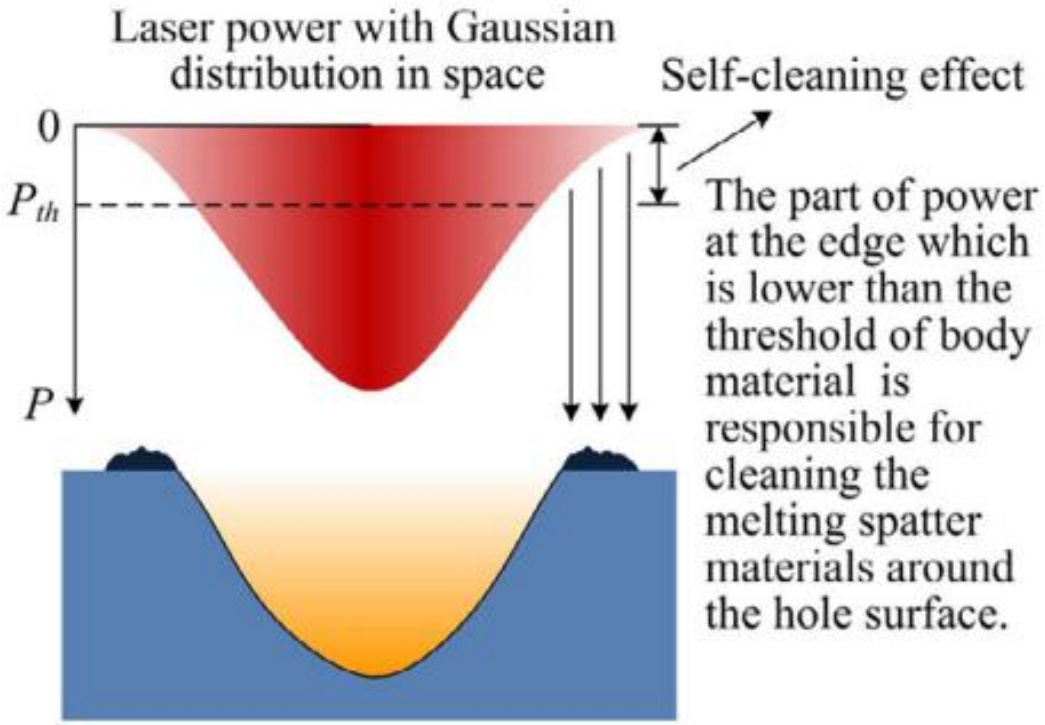
激光打孔

大连理工大学国家示范性微电子学院（筹）

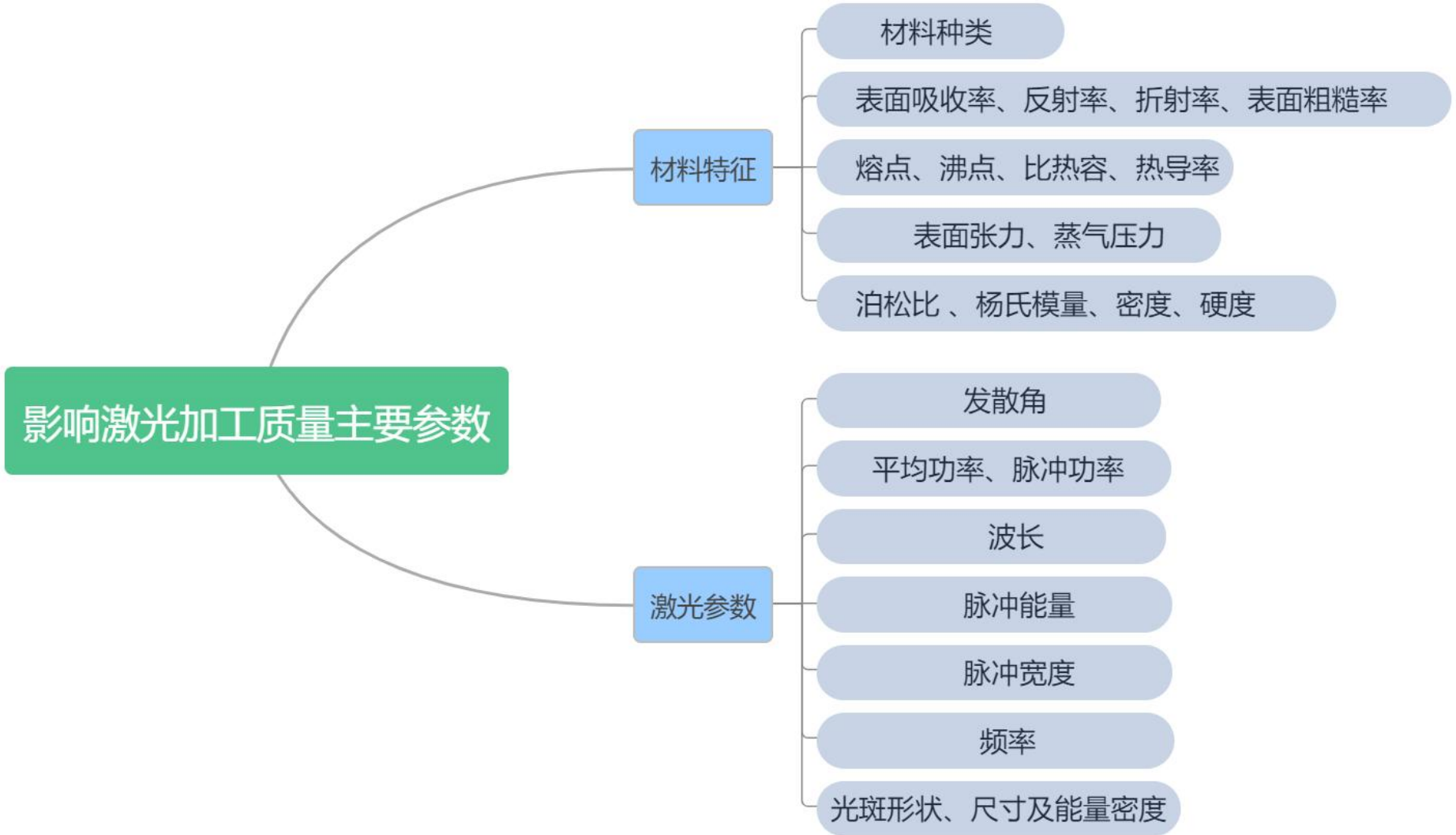
徐瑞良

2022年5月13日

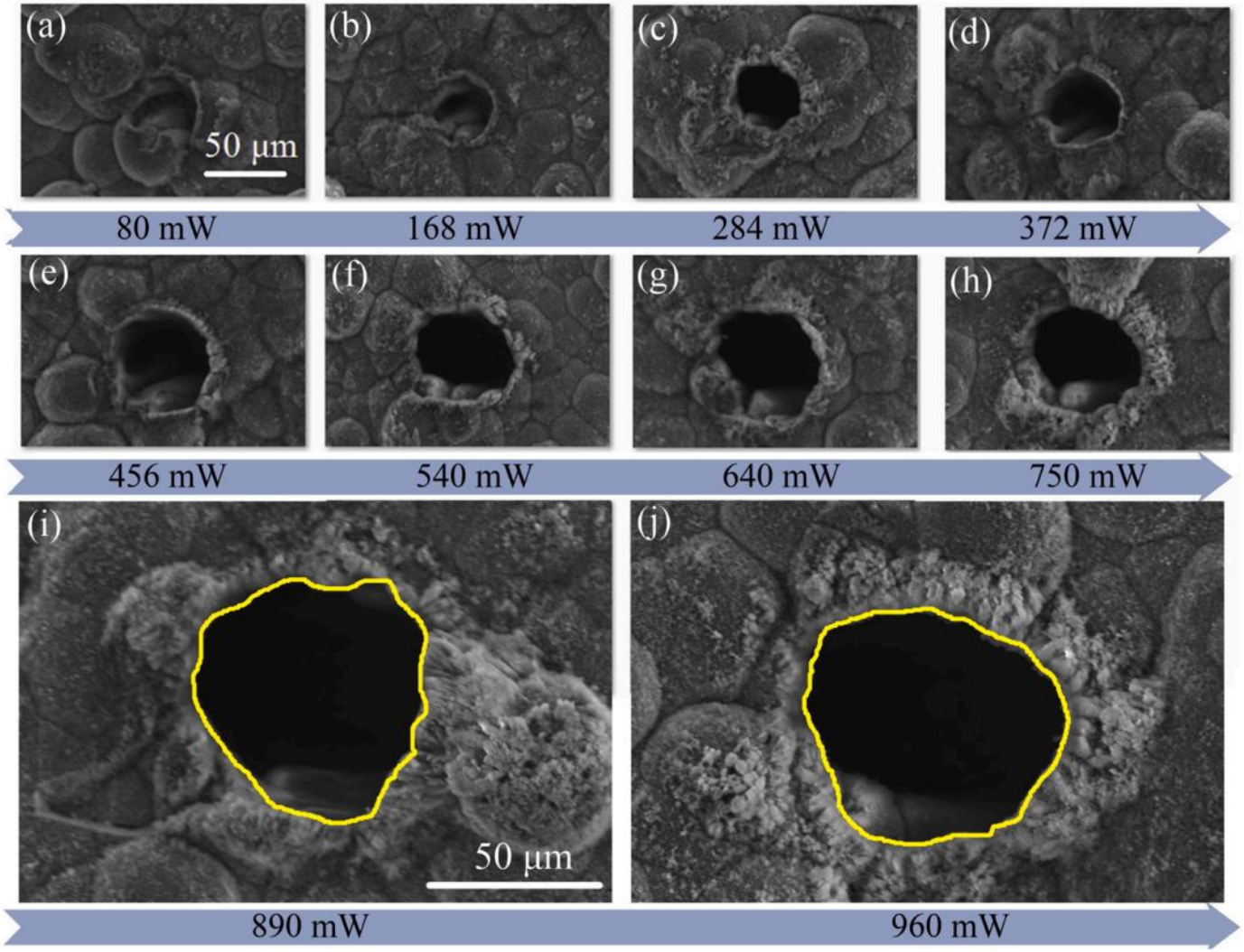




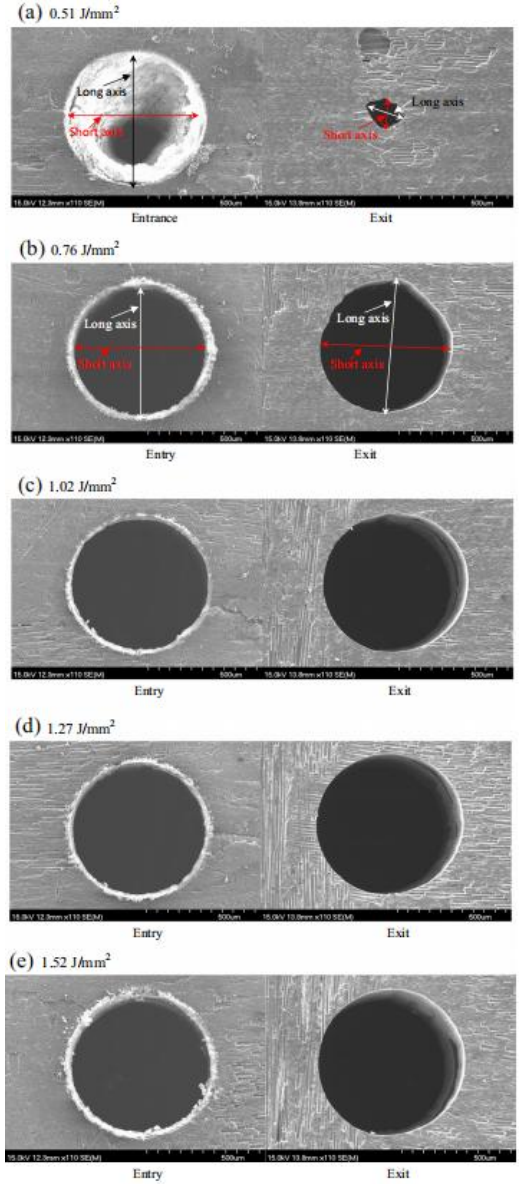
Sf A , Materials Science in Semiconductor Processing, 105:104701-104701.


影响激光加工质量主要参数
材料特征
材料种类
表面吸收率、反射率、折射率、表面粗糙率
熔点、沸点、比热容、热导率
表面张力、蒸气压力
泊松比 、杨氏模量、密度、硬度
激光参数
发散角
平均功率、脉冲功率
波长
脉冲能量
脉冲宽度
频率
光斑形状、尺寸及能量密度

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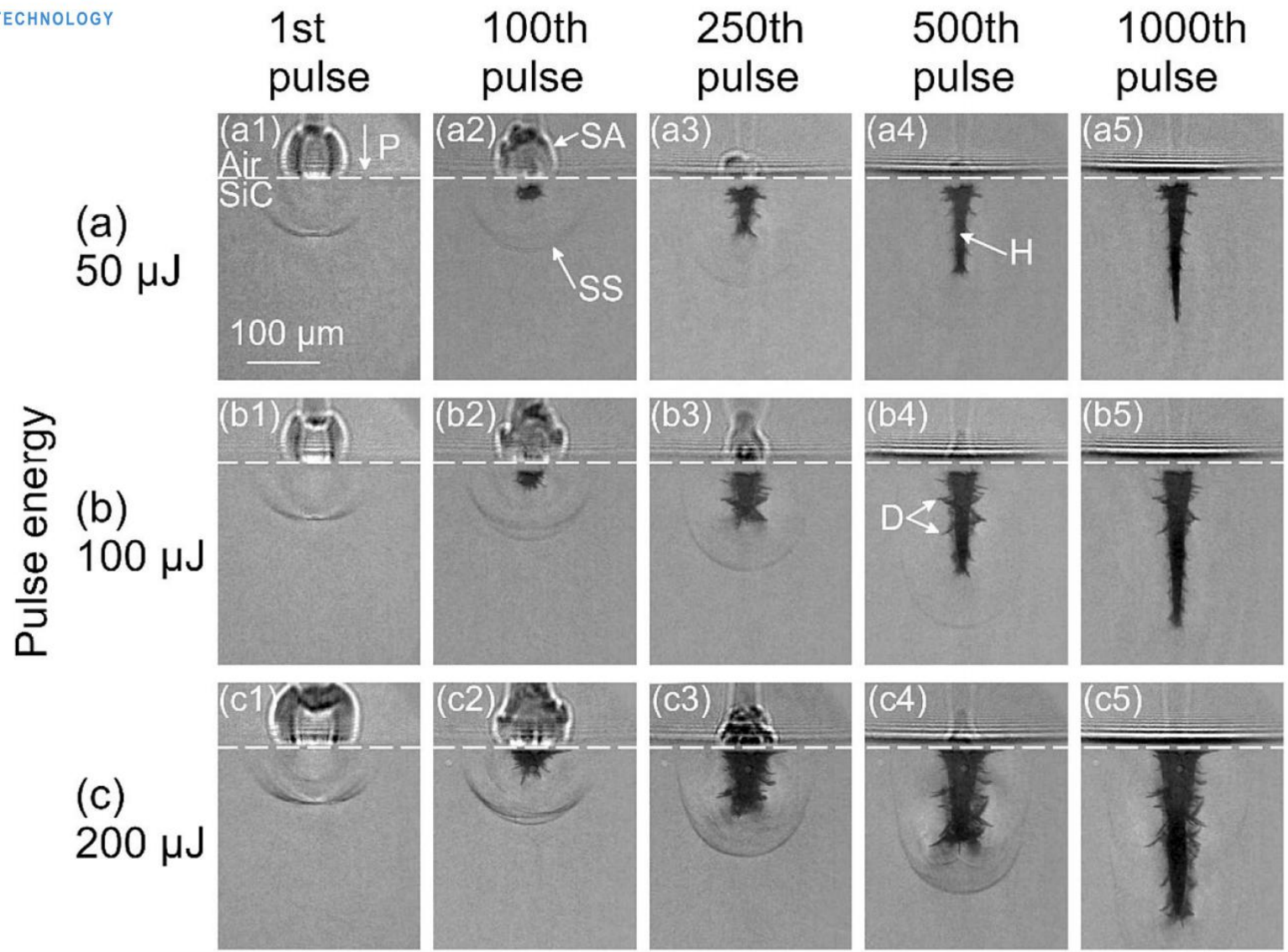


800nm 120fs



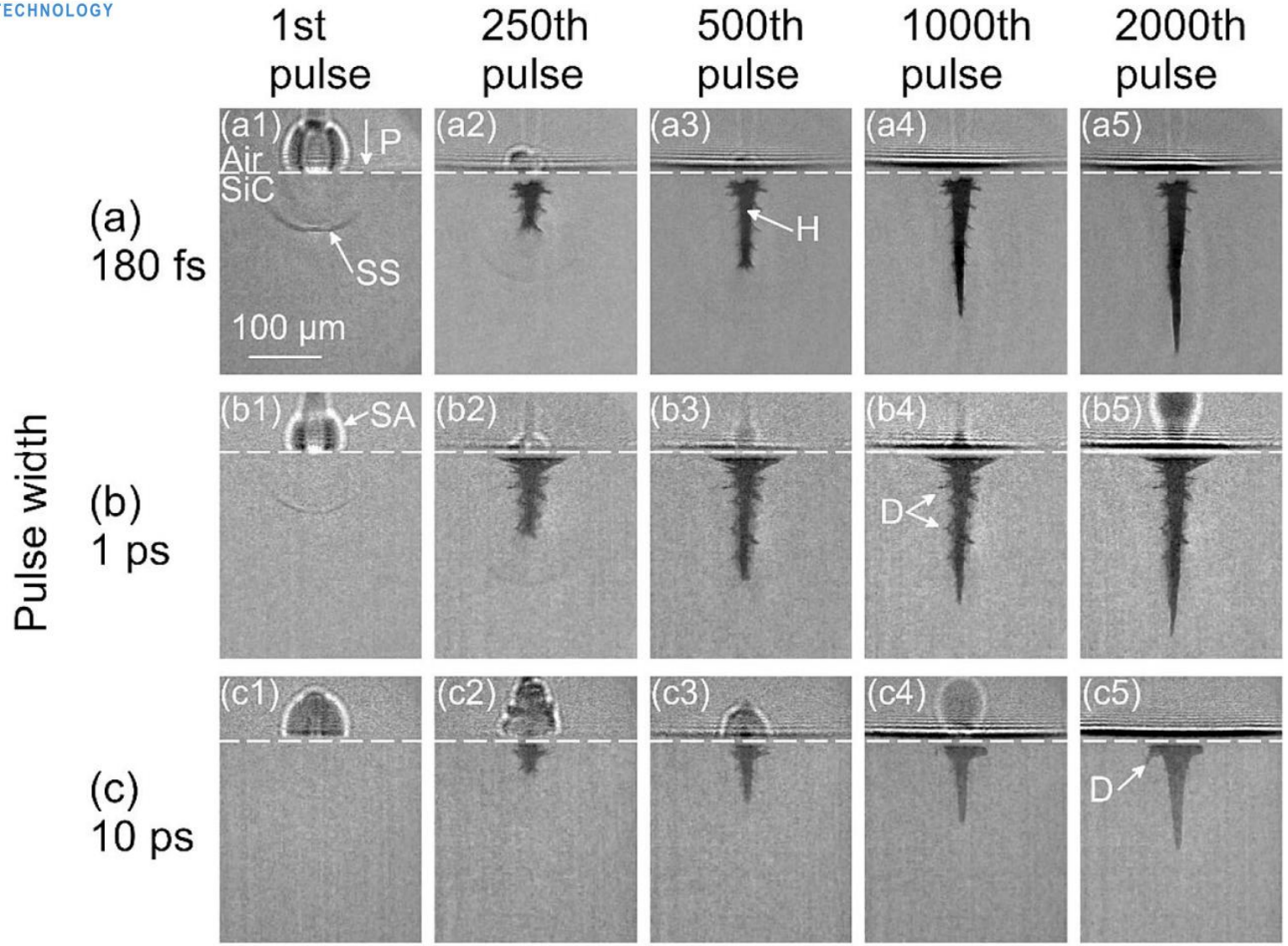
532nm 6.8ps

Hattori J , Ito Y , Jo H , et al. Applied Physics A, 2020, 126(11).
Zhai Z , Zhang Y , Cui Y , et al. Optik - International Journal for Light and Electron Optics, 2020, 224:165719.



Wavelength：515nm
180fs

Liu Y , Wang C , Li W , et al. Journal of Materials Processing Technology, 2014, 214(12).

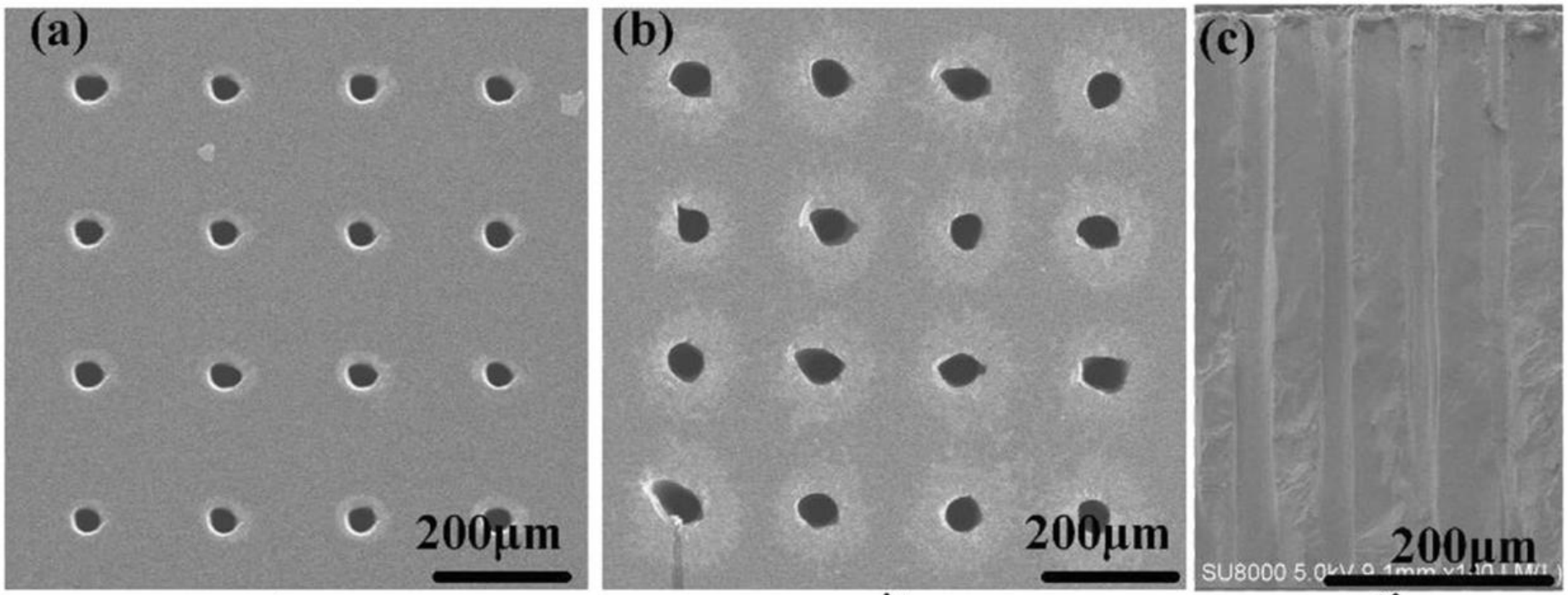


Wavelength：515nm

Liu Y , Wang C , Li W , et al. Journal of Materials Processing Technology, 2014, 214(12).

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515nm 240fs 60uJ/pluse

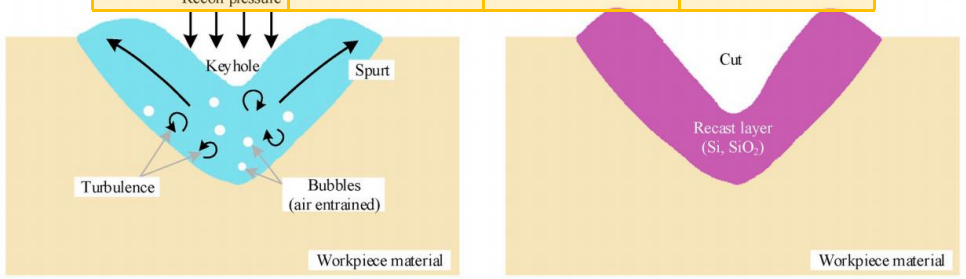


entrances exits sections

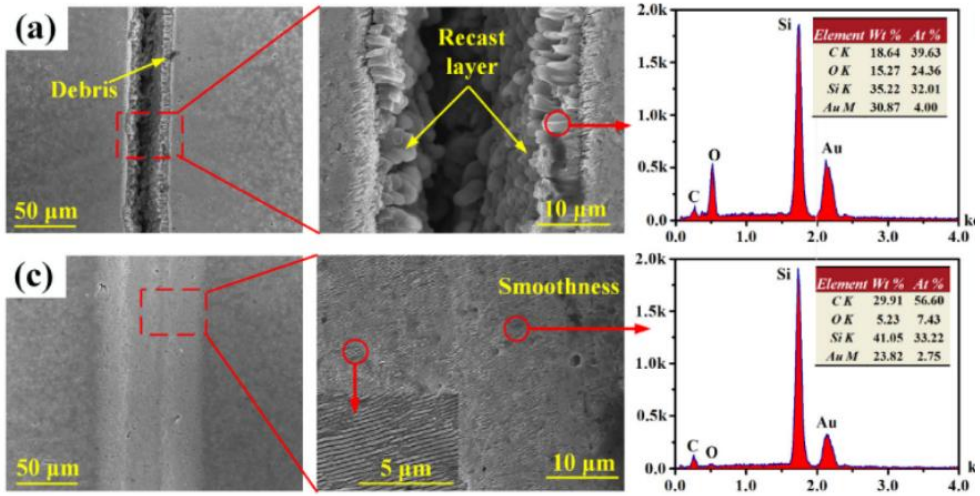
Wang W , Song H , Liao K , et al. International Journal of Advanced Manufacturing Technology, 2020:1-10.

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激光器类型	波长	脉冲宽度	材料
Yb : Glass laser	1030nm	240fs	碳化硅单晶



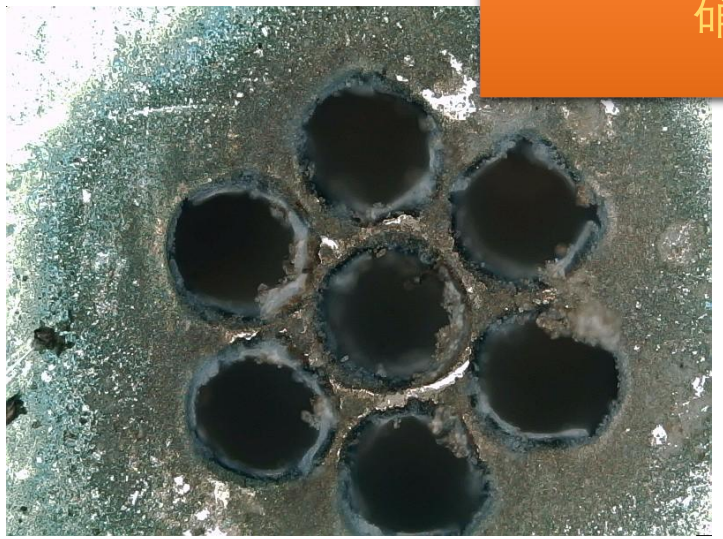
(e) Flow and melt spurting out　　(f) Re-solidification and formation of recast layer



$$SiC(s) + O_2(g) \rightarrow SiO_2(s) + C(s)$$
$$SiC(s) + 2O_2(g) \rightarrow SiO_2 + CO_2(g)$$
$$2SiC(s) + 3O_2(g) \rightarrow 2SiO_2 + 2CO\ (g)$$

清洗前:

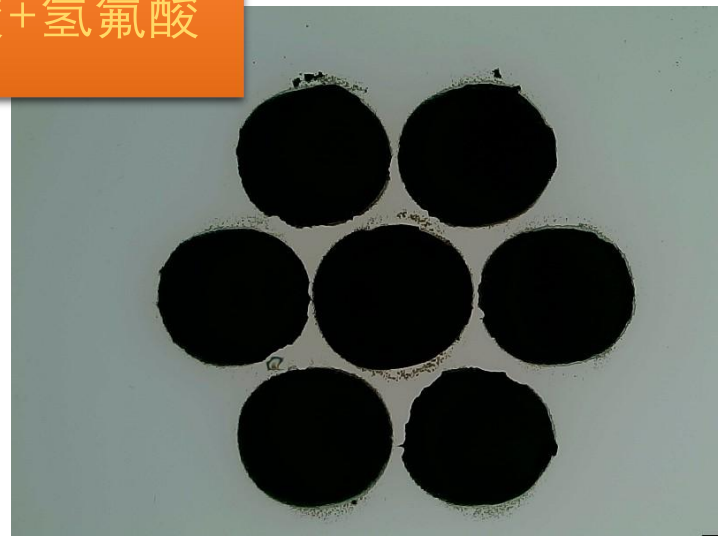




清洗后:



清洗溶液:
硝酸+氢氟酸



Zheng Q , Fan Z , Jiang G , et al. Optics Express, 2019, 27(19):16.

宽带隙
半导体

谢谢大家

欢迎提出宝贵意见