siconnex

PPDC in BATCHSPRAY

Post **P**lasma **D**icing **C**lean

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siconnex | Snap shot

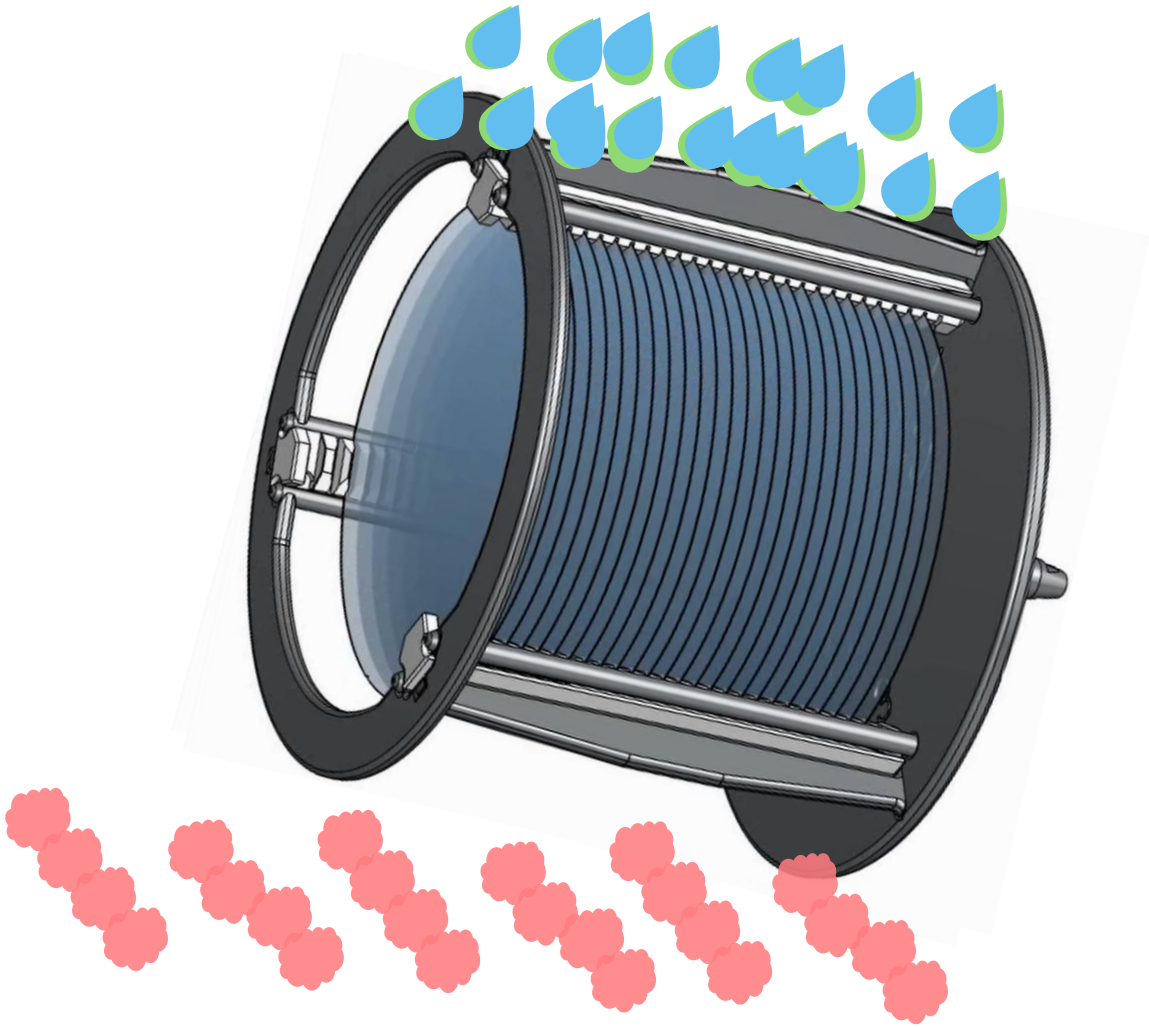


BATCHSPRAY® equipment manufacturing for the semiconductor industry

- 20+ years of experience
- 576 systems sold
- 100% focused on batch spray
- 180 employees
- etch – clean – resist strip

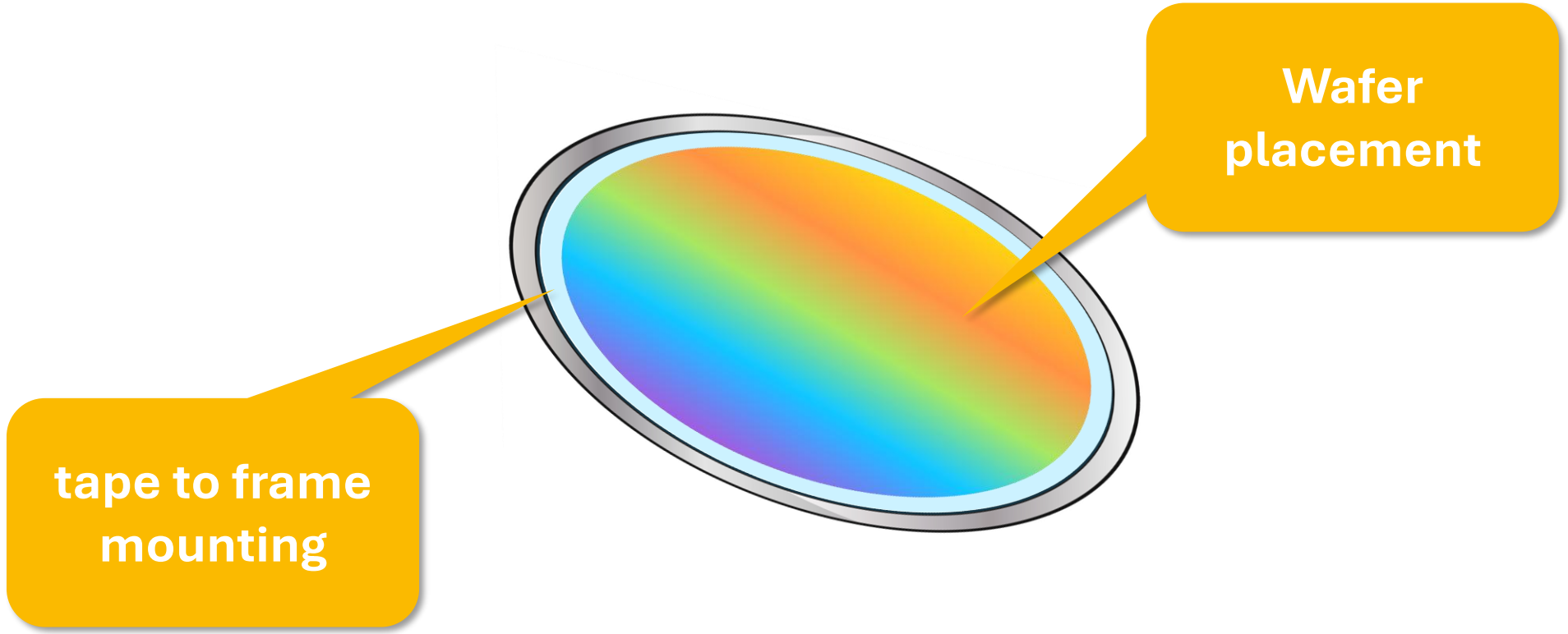
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BATCHSPRAY® Technology



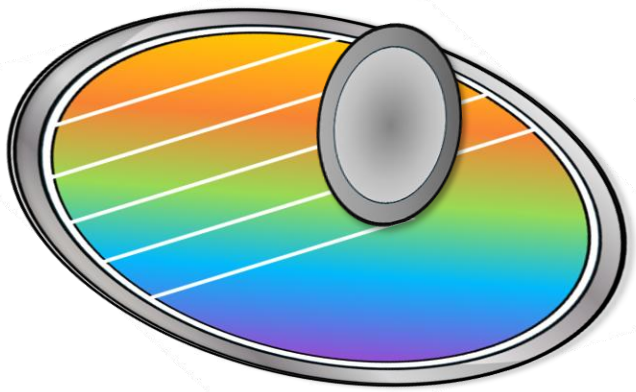
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in preparation of dicing

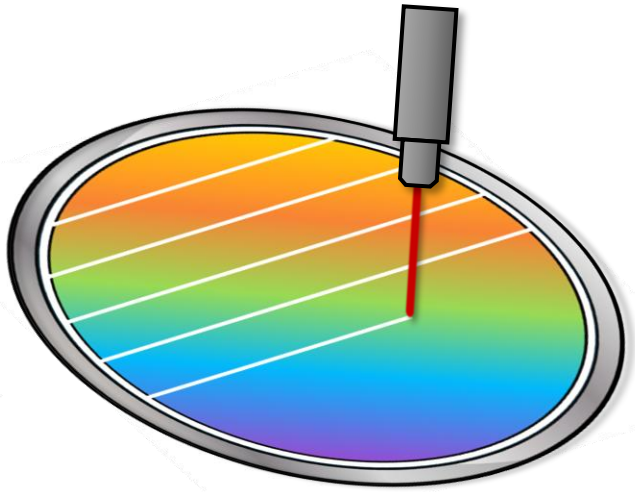


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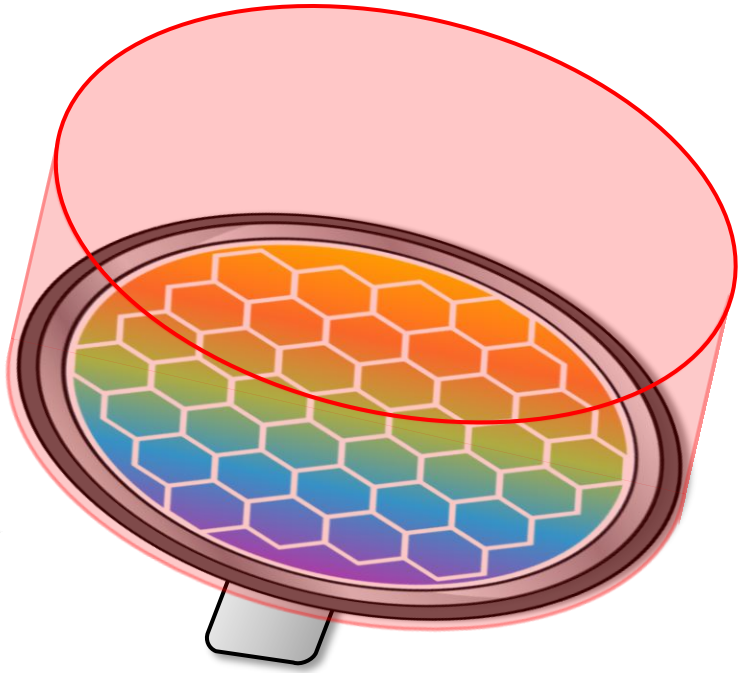
the backstory – blade, laser and plasma dicing



blade dicing



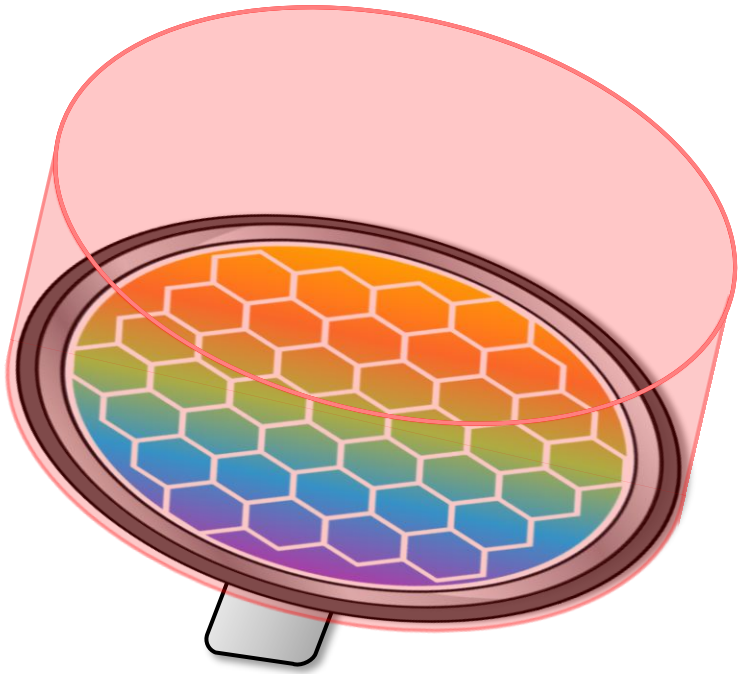
laser dicing

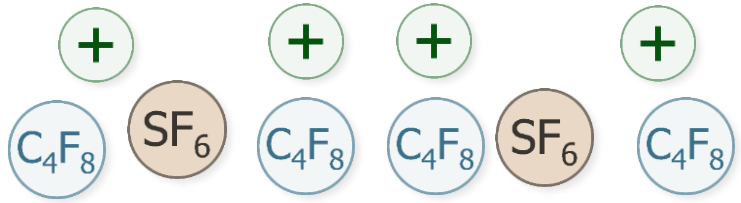


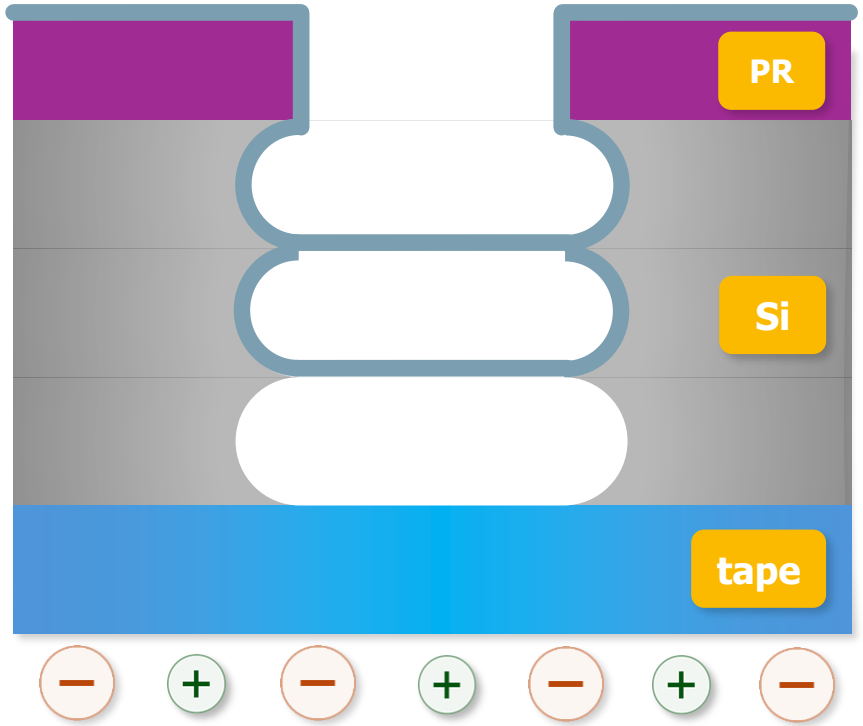
plasma dicing

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principle of plasma dicing







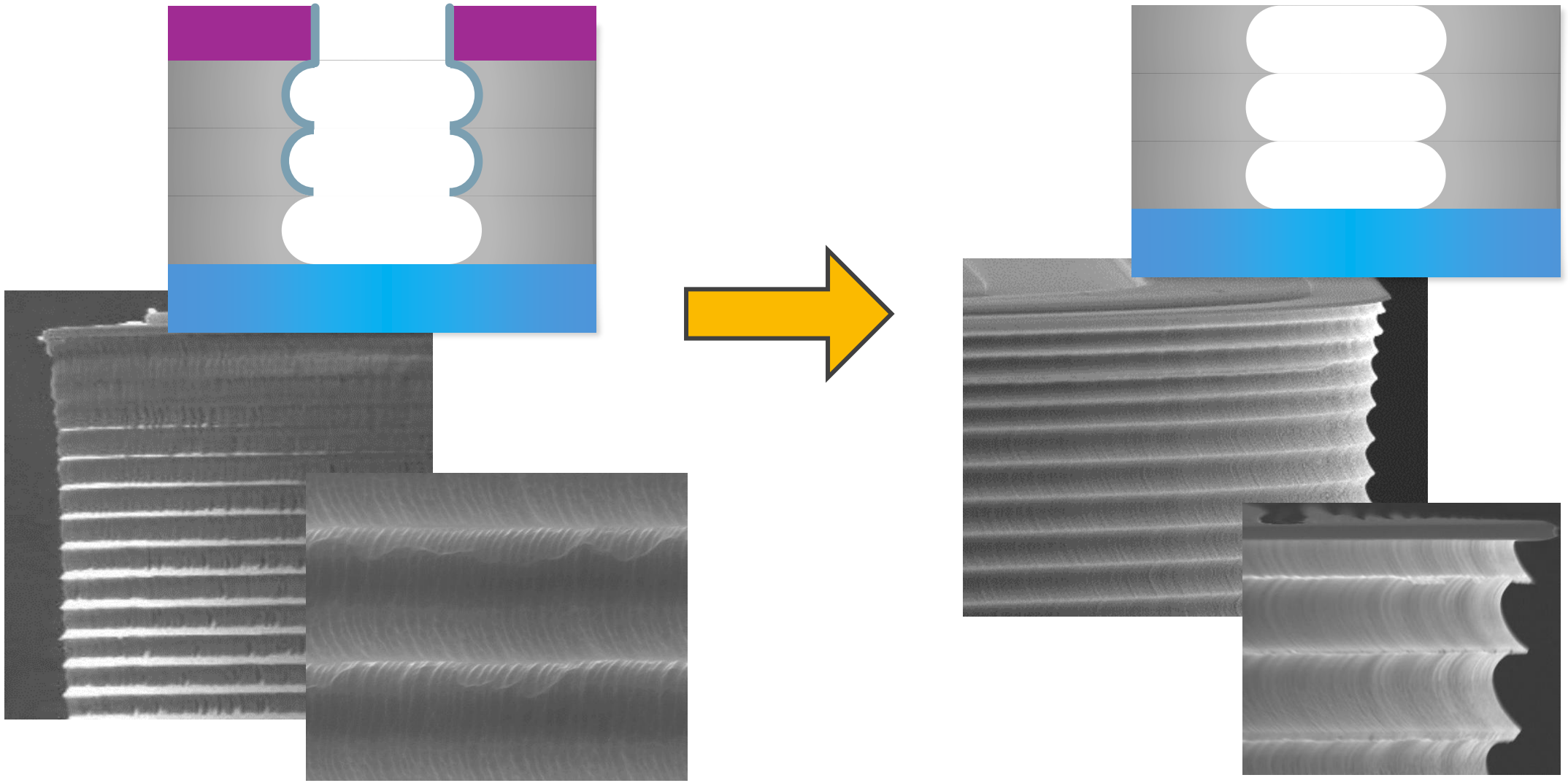
1. SF_6

2. C_4F_8

3. SF_6 + bias

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starting point and goal



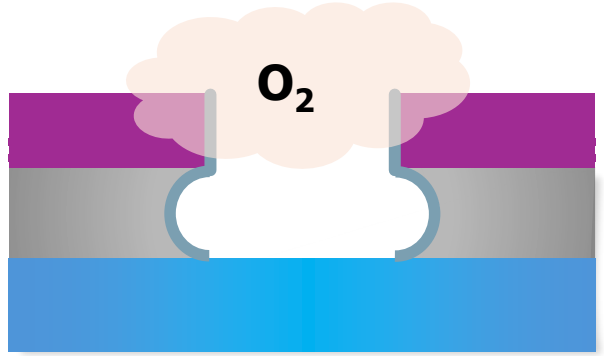
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conventional polymer removal

SPM

solvent

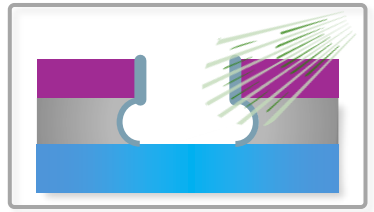
O_2 ashing



removal of ash residues

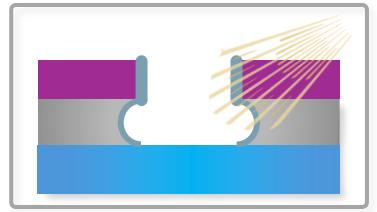
\+

SPM



\+

solvent

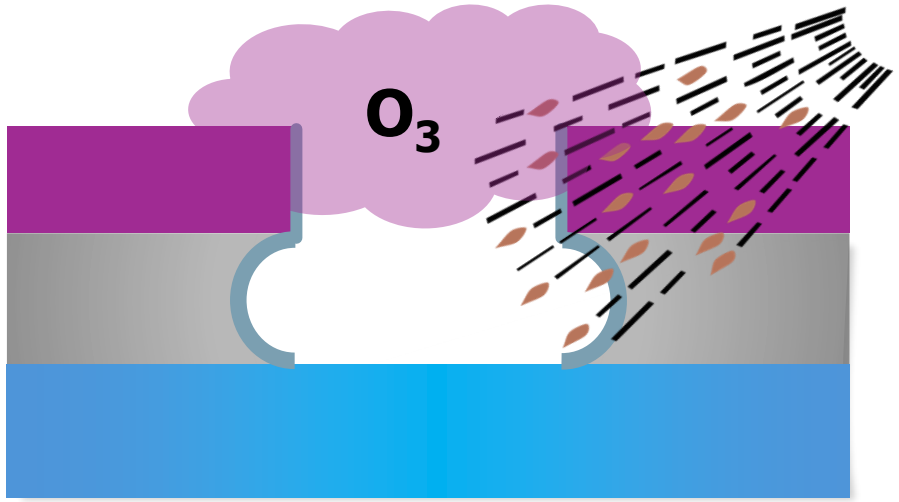


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latest invention for polymer and PR removal

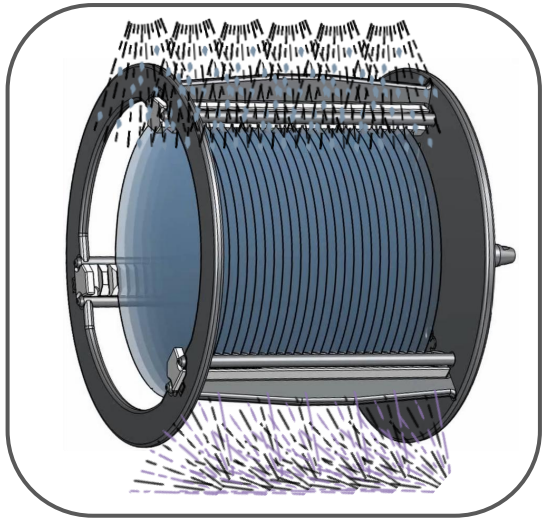
PPDC

Post **P**lasma **D**icing **C**lean



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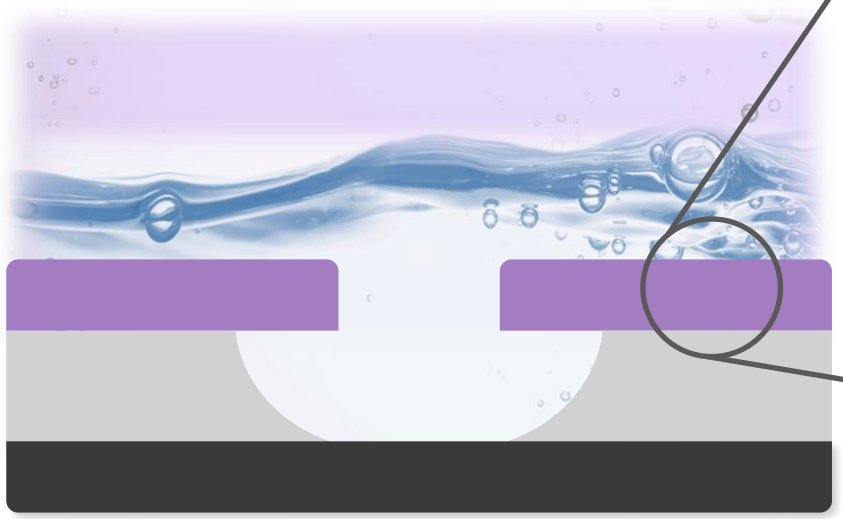
how PR strip works...

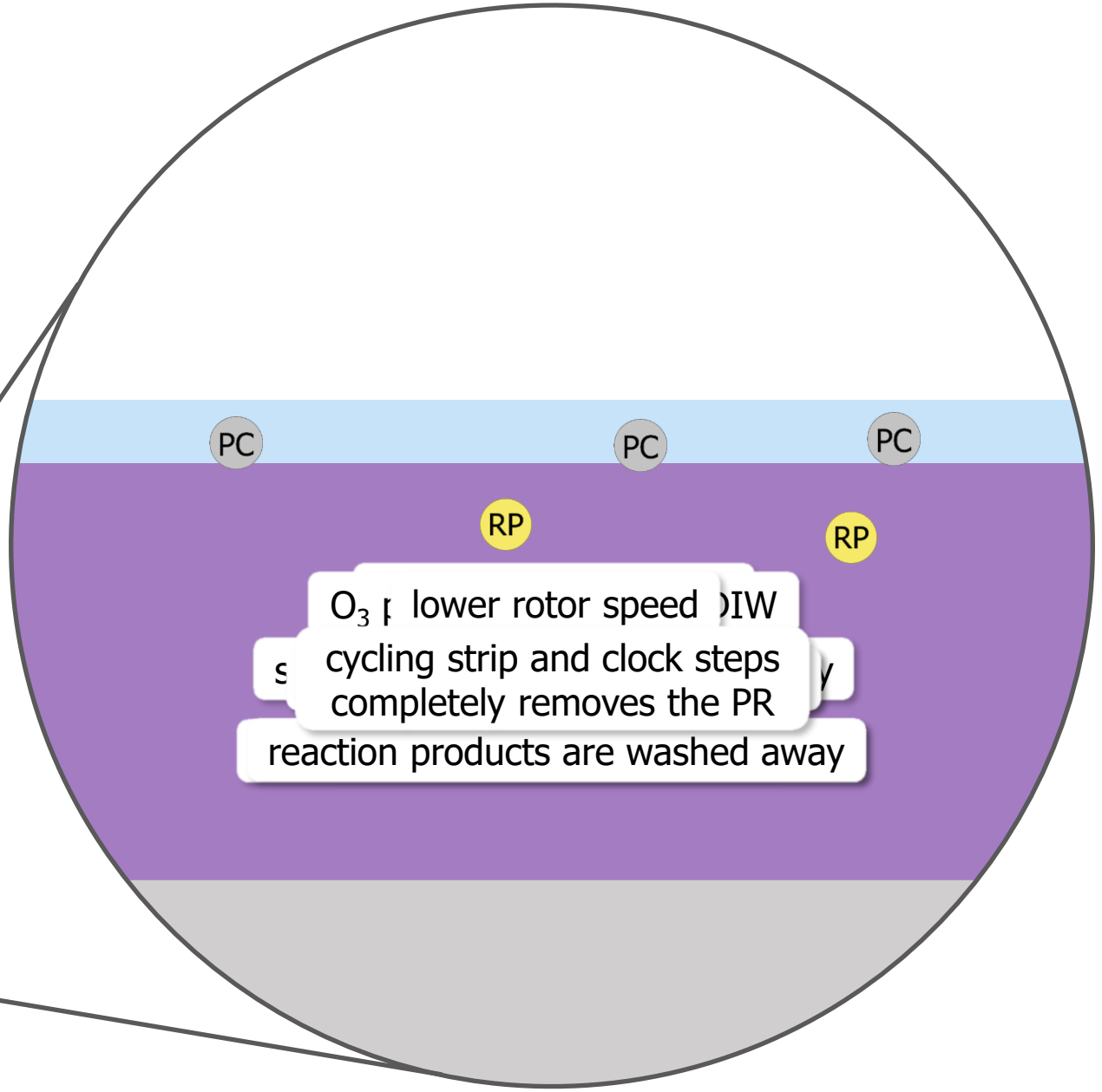


warmup

strip

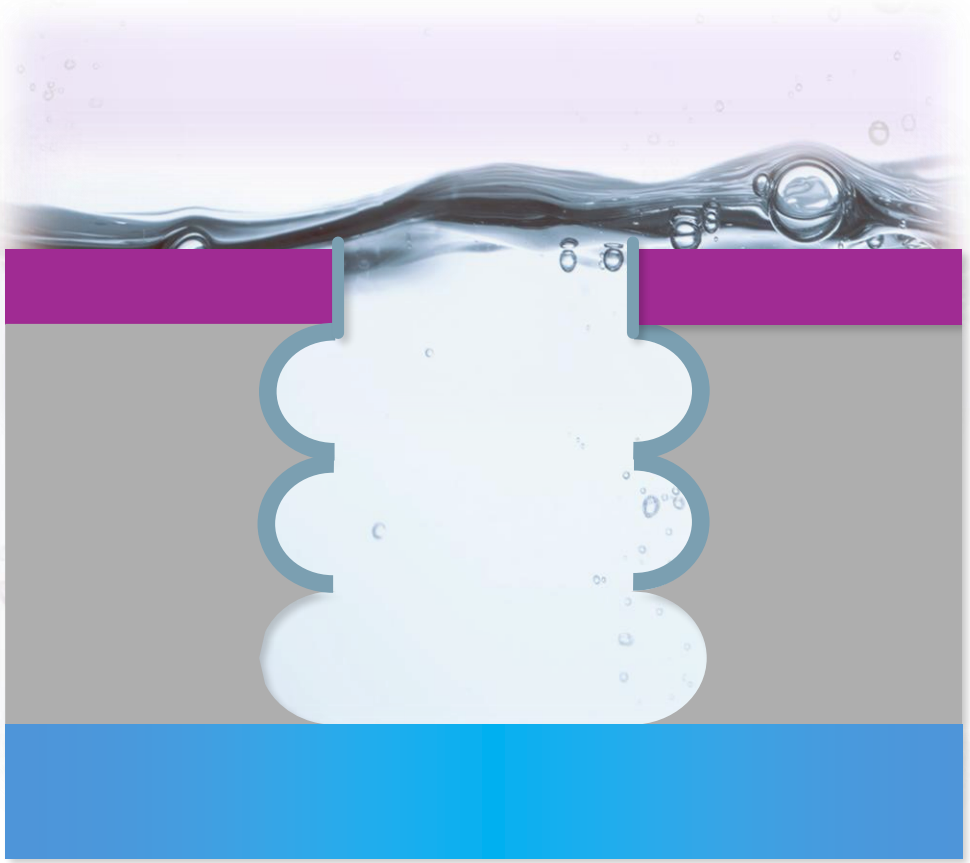
clock



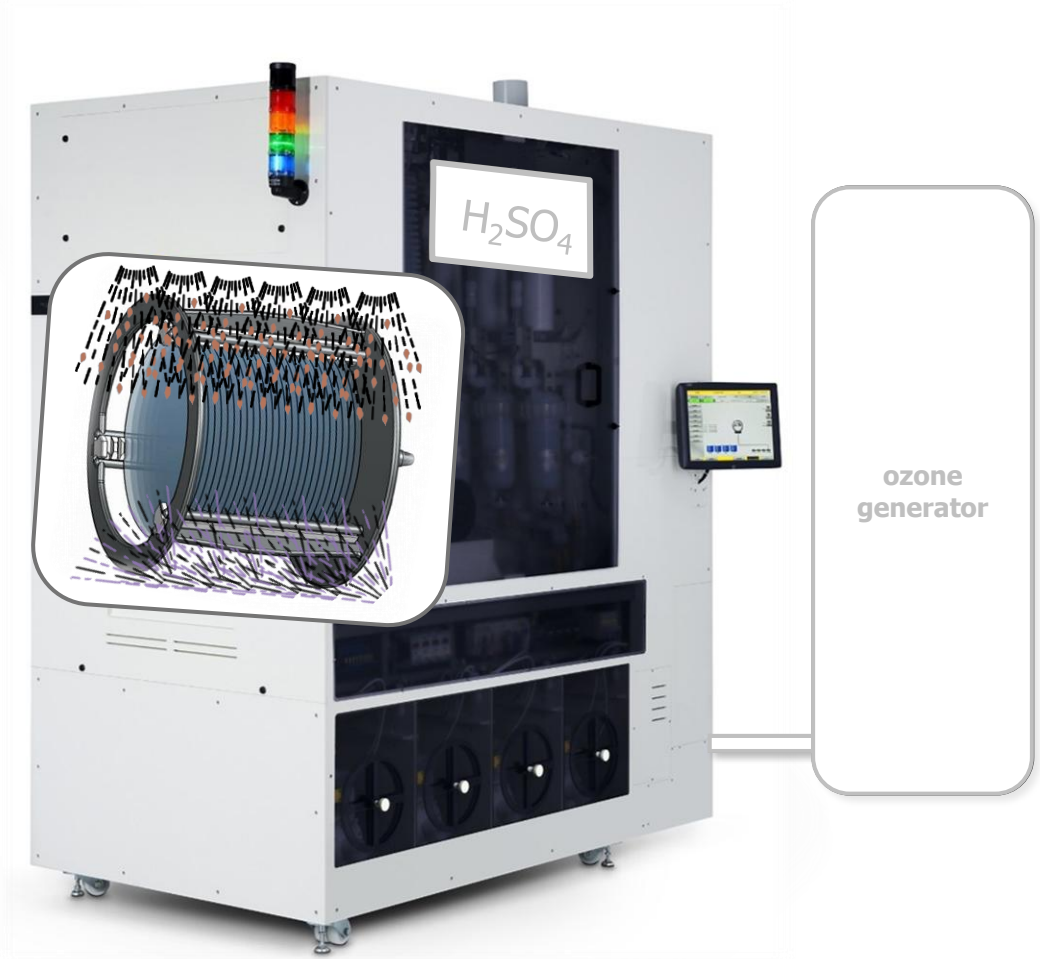


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SOM for polymer removal

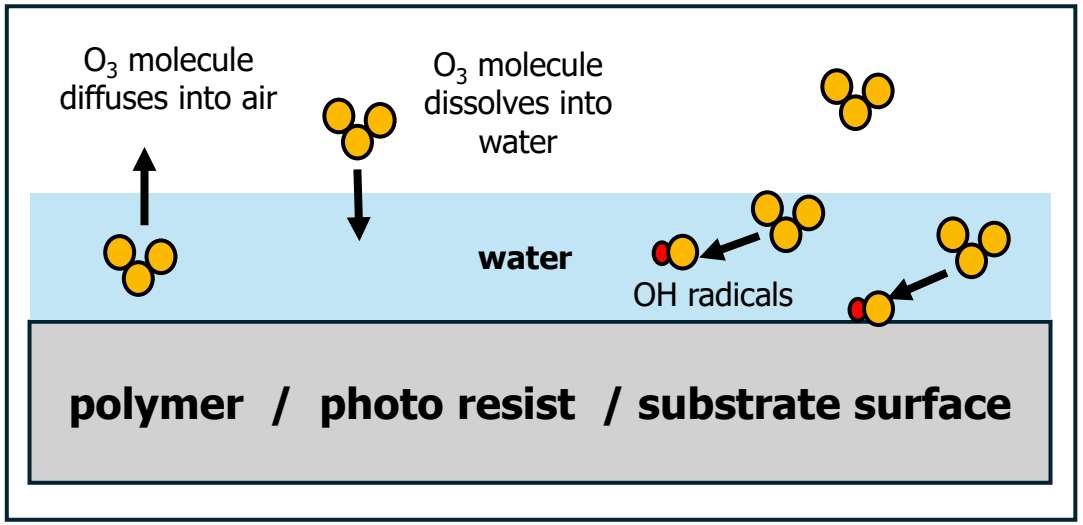


1st – warm up ⇨ 2nd – **S**ulfuric**O**zone**M**ix Clean

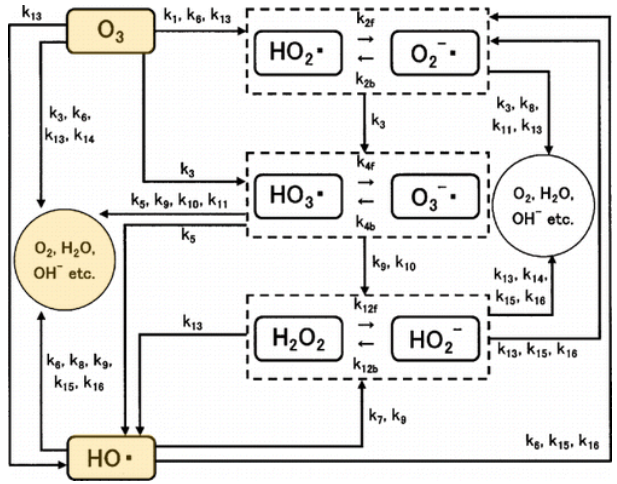


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the process – O_3 in strip-step DIW layer



ozone decomposition pathways



Ref: Tadao Mizuno , Hiroshi Tsuno & Harumi Yamada (2007) Development of Ozone Self-Decomposition Model for Engineering Design, Ozone: Science & Engineering, 29:1, 55-63, DOI: 10.1080/01919510601115849

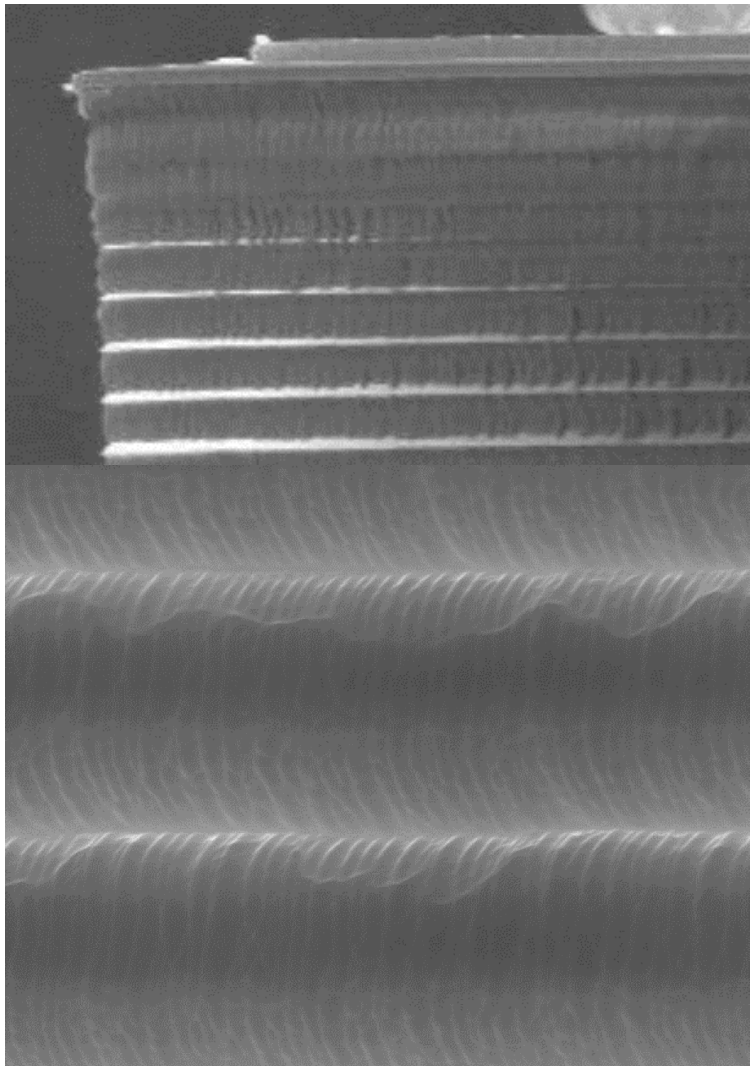
common oxidants and their oxidation potential

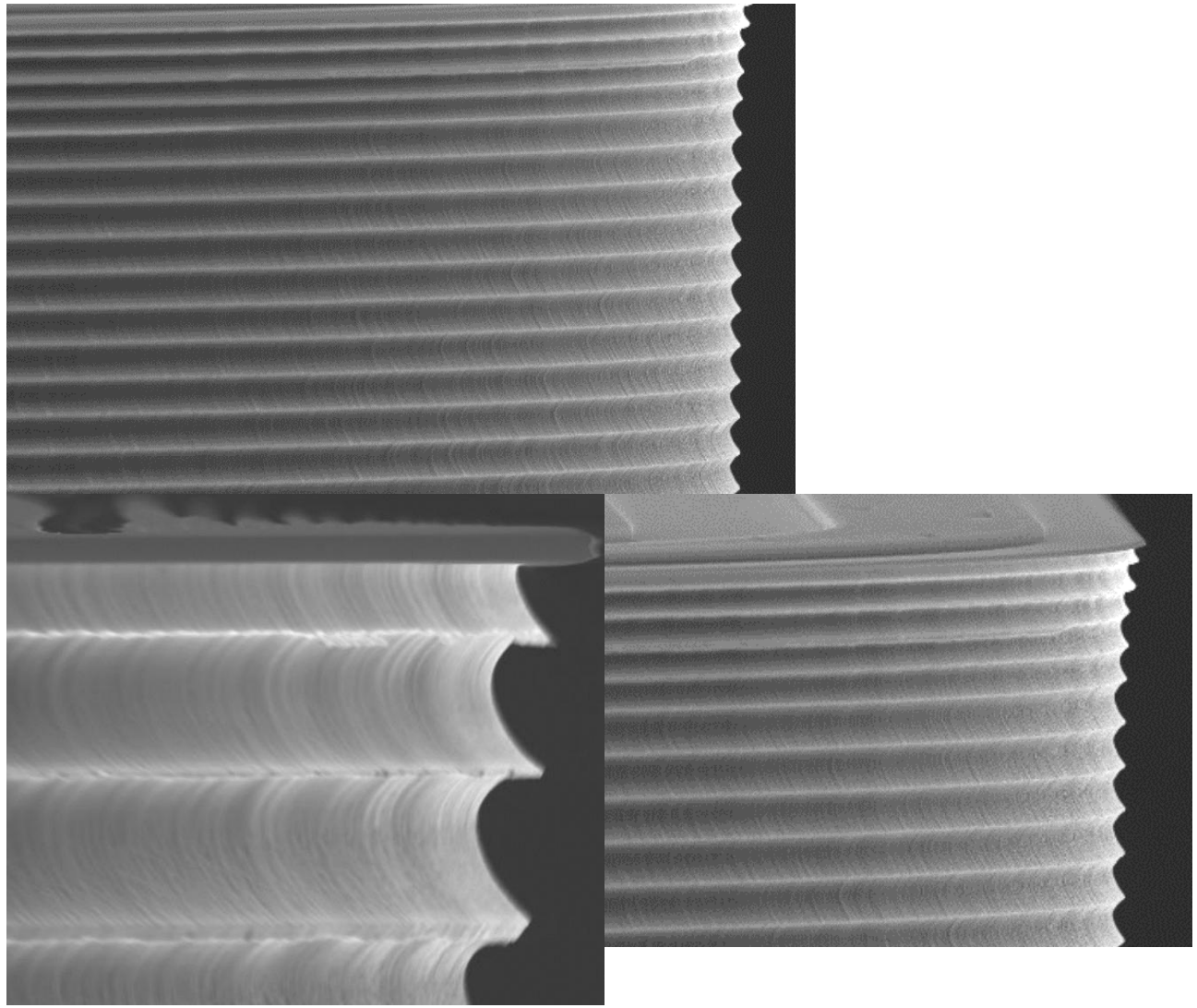
Oxidant	Oxidation Potential, E^0 (V)
Fluorine (F_2)	2.87
Hydroxyl radical ($HO•$)	2.80
Sulfate radical ($SO_4^{-}•$)	2.60
Peroxymonosulfuric acid (H_2SO_5)	2.51
Ozone (O_3)	2.08
Hydrogen peroxide (H_2O_2)	1.78
Persulfate ($S_2O_8^{2-}$)	2.12
Permanganate (MnO_4^{-})	1.68
Chlorine dioxide (ClO_2)	1.57
Chlorine (Cl_2)	1.36

Ref: Oh, Wen-Da & Dong, Zhili & Lim, Teik. (2016). Generation of sulfate radical through heterogeneous catalysis for organic contaminants removal: Current development, challenges and prospects. Applied Catalysis B: Environmental. 194. 10.1016/j.apcatb.2016.04.003. + Wikipedia

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the process – results





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BATCHSPRAY® ENGINEERING

- proven concept
- increase in throughput
- reduction of chemical media cost
- reduction of waste treatment cost
- reduction of cost per wafer



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Thank you!

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