NDS

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Dicing Fluids: the Key Element for Smart Dicing

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Traditional and current dicing fluids

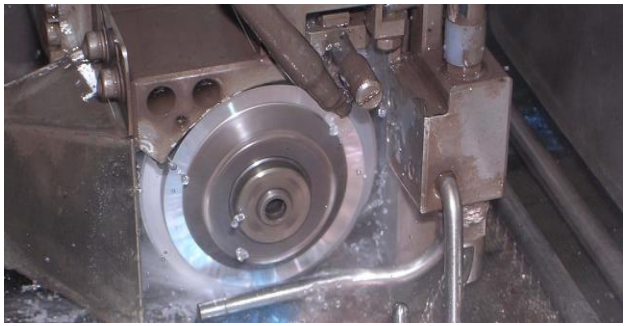
TRADITIONAL DICING FLUID **Pure water**

- wet and cool the wafer surface, but not good enough
- not prevent the formation of static charge on the wafer surface during dicing
- too high surface tension, slowing down the wetting and spreading process

CURRENT DICING FLUIDS **Mixture of water and CO_2**

- reduces the formation of static charge.
- shortens blade life due to low pH of H2CO3 solution
- not effectively removes debris from dicing process
- results in bonding failure in later process due to the silicon debris
- increases the AL-Cu pad Electrochemical corrosion

Future dicing fluids



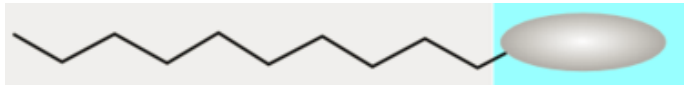
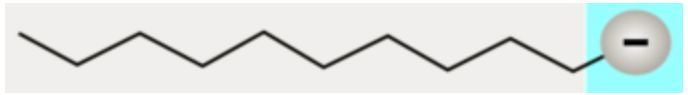
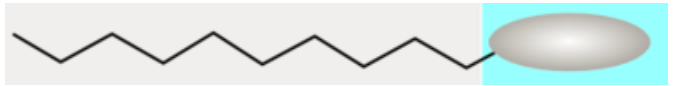
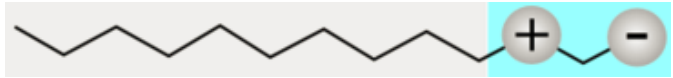
Challenges in semiconductor dicing

- Narrower dicing streets within sub-micrometers
- More accumulated debris
- Increased dicing time
- More electrochemical corrosion on Cu/Al substrate

Future dicing fluids

- Designed and developed with
  - specialty surfactants
  - anti-static charge agents
  - fast wetting agents
  - effective lubricants and cooling agents
  - microbicides etc.
- A dicing fluid is diluted with DI water through auto-distribution system to
  - reduce surface tension to prevent formation of silicone debris on substrate
  - reduce chippings and burrs by fast cooling and lubrication
  - prevent electrochemical corrosion on substrate and blade

Future dicing fluids: Surfactants

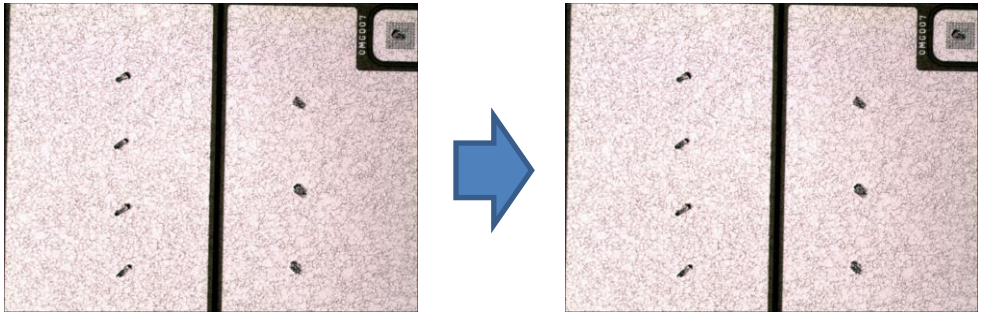
Lipophilic tail			hydrophilic head
Anionic		+	Na^+, K^+, NH_4^+
Cationic		-	$-COO^-$, $-SO3^-$, $-SO4^-$, Cl^-
Nonionic			no charges
Amphoteric / zwetterionic			both charges

Valtron TriAct Dicing Fluids

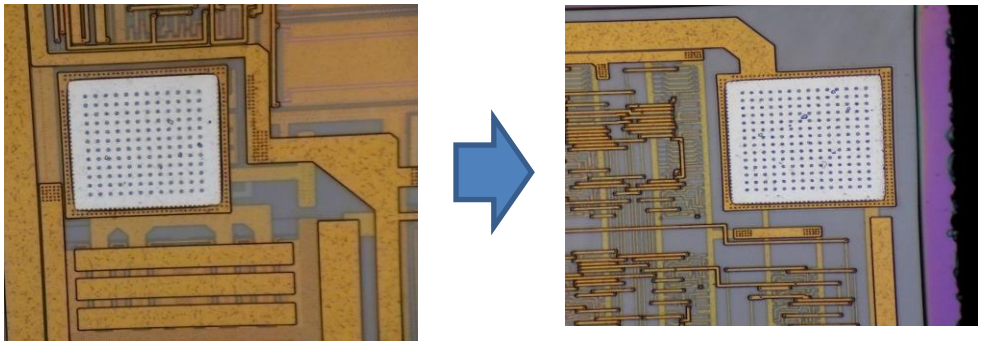
Item	Specification
Appearance	Transparent liquid
Density: g/ml	0.9 to 1.1
pH	6~8
Conductivity	0 to 300 µS/cm
Foam profile	Low to medium
Surface tension: dynes/cm at Dilution	<35 @ 1: 400 <45 @ 1:2000 <50 @ 1:4000
Use temperature	R.T.

Stains and oxidation

MOS pipe
1:4000



Copper line
1:4000



Results

- No residual stains on surface of dices
- No silicon debris and oxidization

Experiments

Corrosion Inhibition

- 1: 3 mixture of Valtron TriAct dicing fluid to DI water
- 5 mos tube chips (without surface protective film, aluminum surface exposed) are submersed in the mixture for 24 hours

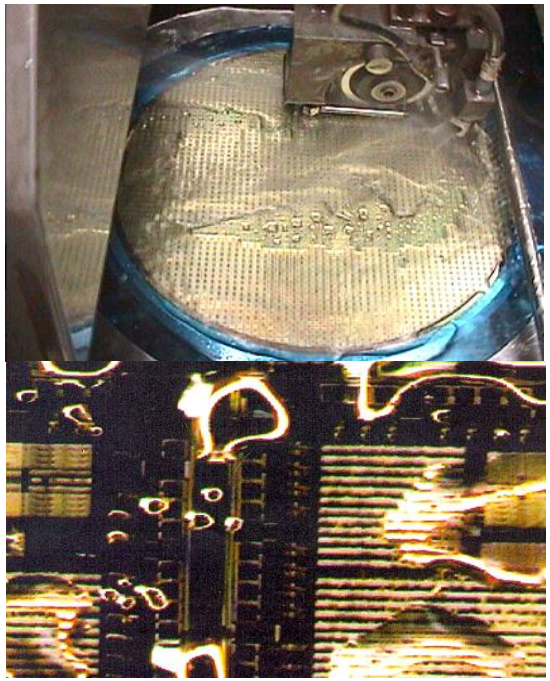
Before submersion

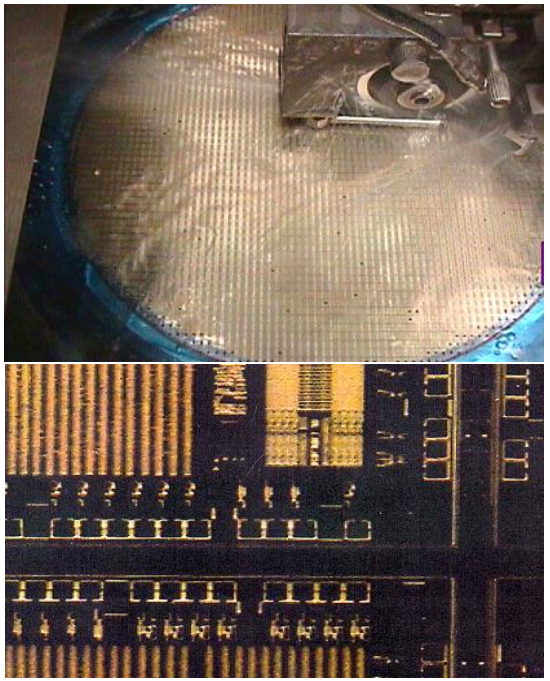
After submersion

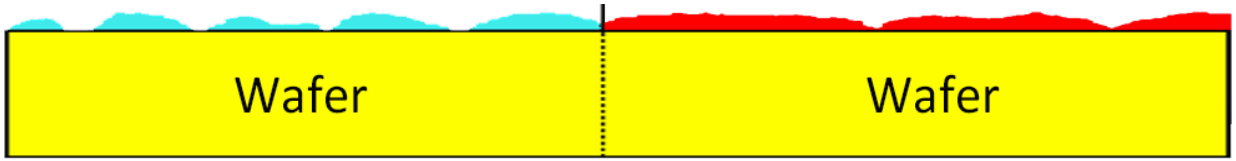
Results

- The surface of aluminum chips show no corrosion or oxidation
- The dicing fluids does not corrode the aluminum surface

Surface tension



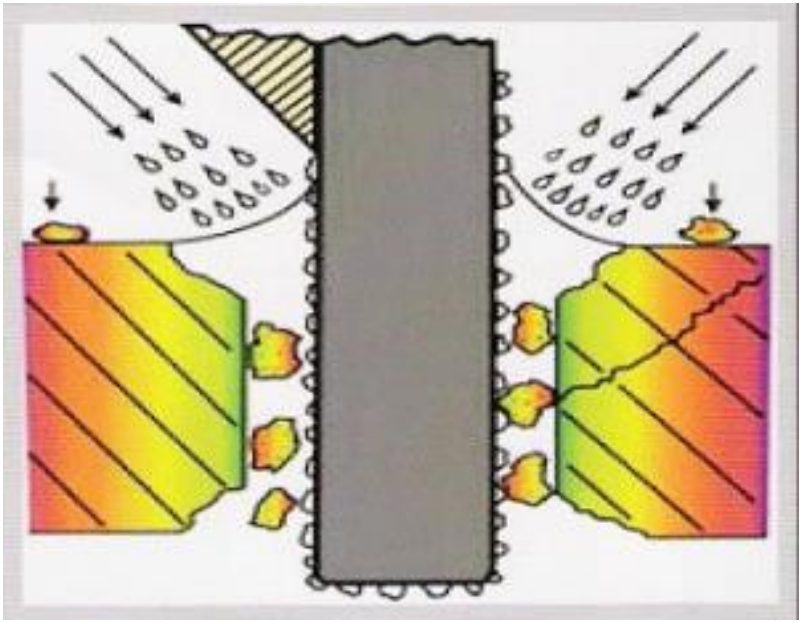




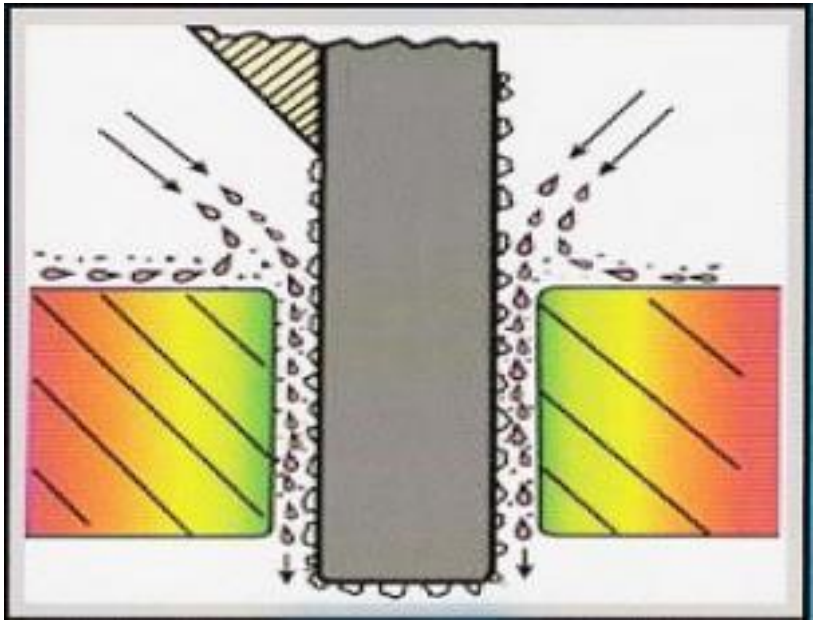
DI water + (CO_2)

DI water + (CO_2)
+ **Dicing Fluids**

Blade life



Before



After

Conclusions

Valtron TriAct Dicing Fluids

- Low surface tension
- Low contact angle
- Low to middle foaming
- Proper conductivity
- Fast wetting and spreading
- Efficient lubrication and cooling
- Good removal of silicon debris and metal particles
- No corrosion on substrates or dices

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THANK YOU FOR LISTENING

顧客満足から感動へ。

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