



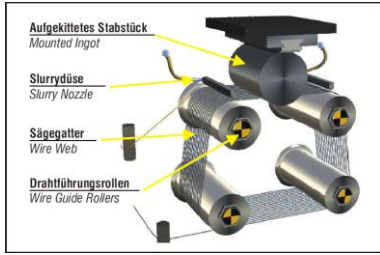
Wafer manufacturing in a new process

New wafer manufacturing process for cost reduction and quality improvement

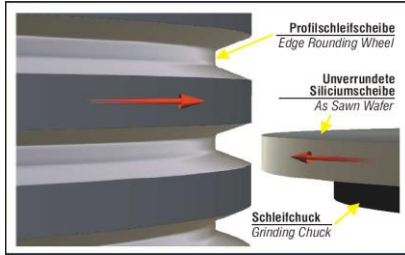
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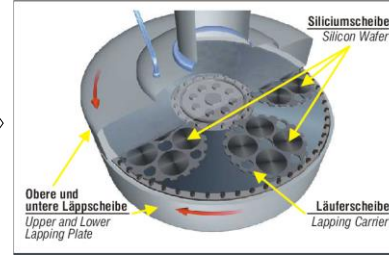
Skip of process step & Reduced process time for 300mm wafer



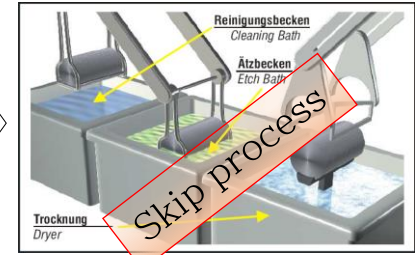
1. Multi wire sawing
(ingot block into single wafers)



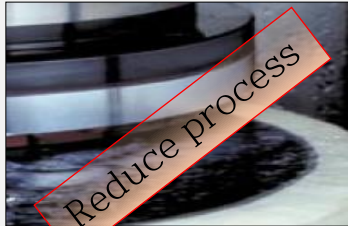
2. Edge grinding
(shaping the edge of the wafer)



3. Lapping
(smooth and flat)
Remove THK 20~25 μm

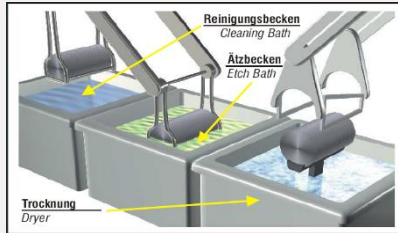


4. Chemical etching(KOH)
(eliminating process damages)
Remove THK 20~25 μm
Etch rate : 1.5 μm
Processing time : about 15min



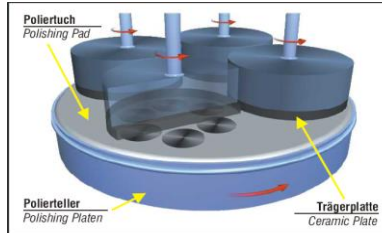
5. Double side grinding
(removing small bumps)

Remove THK 20~30 μm
Feed rate : about 10 μm

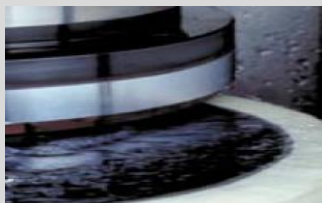


6. Slight etching(KOH)
(grinding damage relief)

Remove THK 3 μm
Etch rate : 1.5 μm
Processing time : about 2min



7. Polishing (3 step)
(removing fine bumps)
Remove THK 15 μm



5. Double side grinding

Remove THK 5~7 μm
Feed rate : about 10 μm
Reduced removal time to 1/4



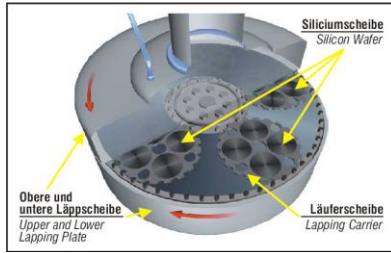
6. Chemical polishing(New etchant)
(Mechanical damage relief)

Remove THK 40 μm
Etch rate : 10 μm
Processing time : about 4min

▷ Skip of process step

- ✓ No.4 step을 skip하여 공정을 단축한다.
- ✓ No.5의 grinding 제거 두께를 최소화하여 공정 시간을 단축한다.
- ✓ No.6의 slight 공정 대신에 chemical polishing 공정으로 대체하여 lapping 공정에 의한 damage 층 및 grinding damage 및 wheel mark 를 chemical polishing 하여 mirror surface로 만든 후 polishing(CMP) 공정을 진행한다. (new etchant는 HF,HNO3를 포함하고 있지 않으며 Chemical polishing진행 중에 유해 gas(NOx) 가 발생이 없음.

Application of new etchant for 200mm wafer



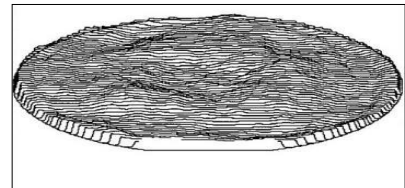
Lapping step (smooth and flat)
Remove THK 20~25 μ m



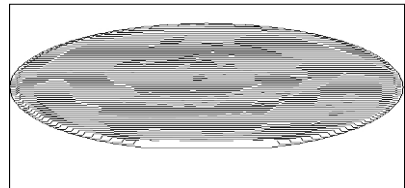
Acid etching(MAE) step (eliminating lapping damages)
Remove THK 25~30 μ m
Etch rate : 25 μ m



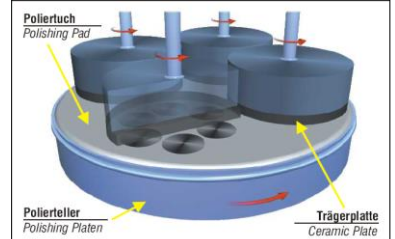
Chemical polishing(New etchant) (eliminating lapping damages)
Remove THK 25~30 μ m
Etch rate : 25 μ m



MAE에 의한 waviness 표면



New etchant에 의한 flat 한 표면



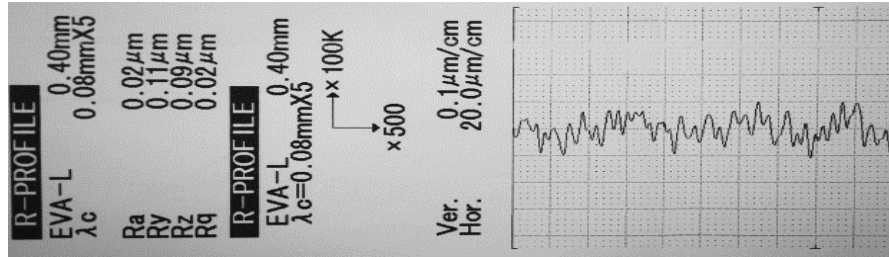
Polishing (step) (removing fine bumps)
Remove THK 15 μ m

- ✓ New etchant 적용 시 benefit
1. Wafer 표면 품질이 개선됨
 2. Wafer의 평탄도(TTV) 및 shape가 향상됨
 3. 유해 가스(NOx) 가 발생하지 않음
 4. HF /HNO3를 함유하지 않은 안정된 Chemical을 사용하여, 약화 위험 및 시설 유지 비용이 감소함

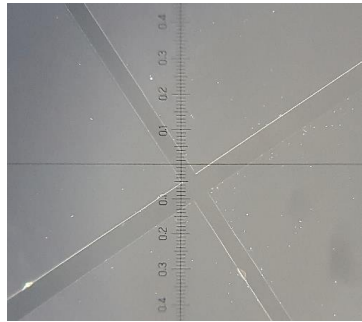
Quality of wafer surface



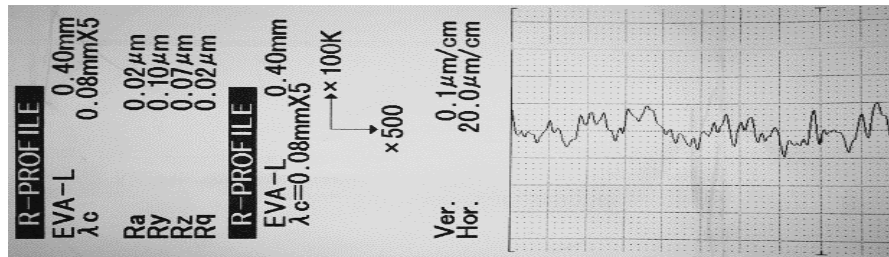
Surface shape of ground



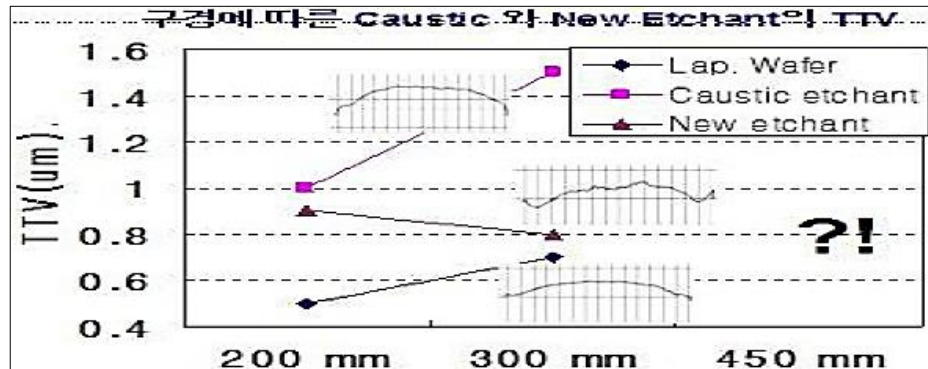
Fine grinding(#2,000grit)의 표면은 grinding wheel mark 및 grinding damage를 남긴다.



Surface shape of chemical polished



New etchant를 적용 할 경우 Mirror surface를 얻으며, polishing 후의 표면 품질 및 Metal 오염에 대응이 가능하다.

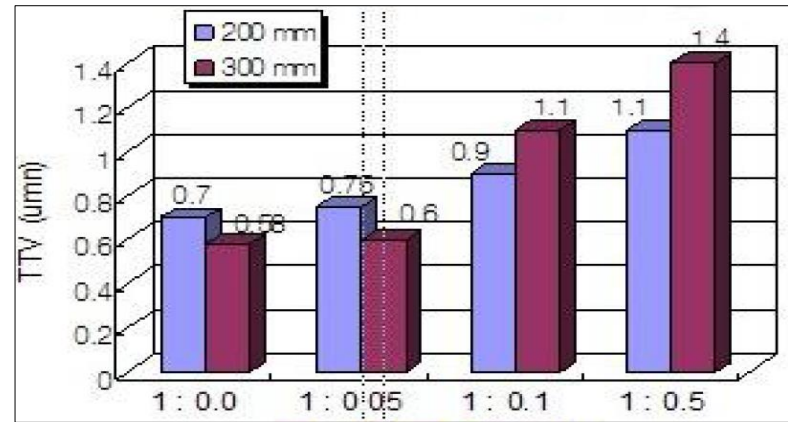


New etchant를 적용 할 경우 200mm 및 300mm 웨이퍼의 평탄도(TTV)는 1µm 이하가 구현됨

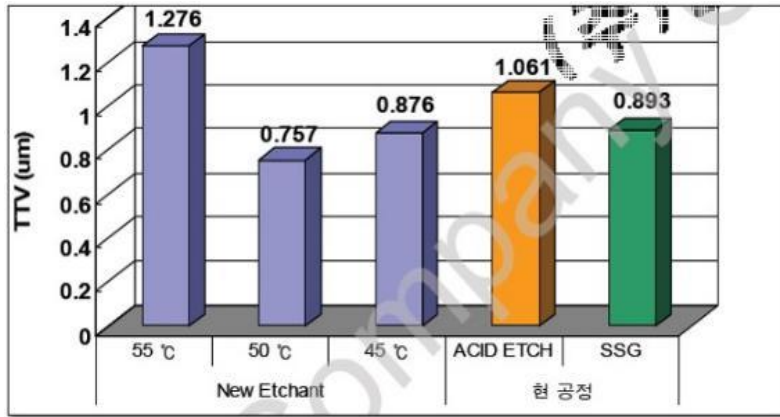
Evaluation of new etchant

THK (after)	ttv	stir	rolloff	온도	Sample
725.695	1.042	0.754	-0.626	50	New Etchant
727.595	1.034	0.757	-0.564		
728.063	1.453	0.946	-0.348		
735.279	0.807	0.373	-0.196	45	
736.121	0.515	0.315	-0.061		
736.182	0.788	0.484	-0.260	Acid	
728.094	1.007	0.369	-0.366		
744.275	0.750	0.185	-0.069	Caustic	

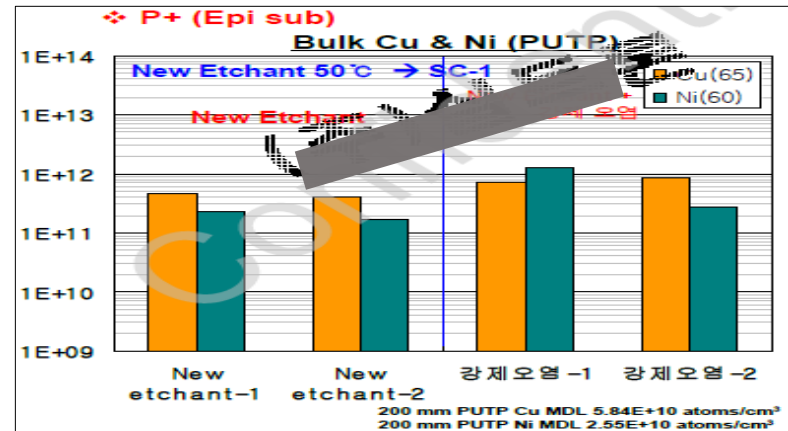
- ✓ New etchant를 200mm wafer에 적용한 결과로 wafer shape 평가 parameter에서 다른 etchant에 비하여 우수한 결과를 얻음.



- ✓ Wafer size(200mm 및 300mm) 별로 New etchant의 조성비에 따른 결과이며, 300mm wafer 가 더 우수한 결과를 얻음. (TTV 허용 spec은 1.0µm 이하임)



- ✓ New etchant를 200mm wafer에 적용한 결과로 적용 온도 별 현 공정 etchant와의 TTV 비교표



- ✓ Test and P + samples M / I 메탈 역 오염 Test 분석 결과 적용에 있어 문제가 없음이 확인되었음