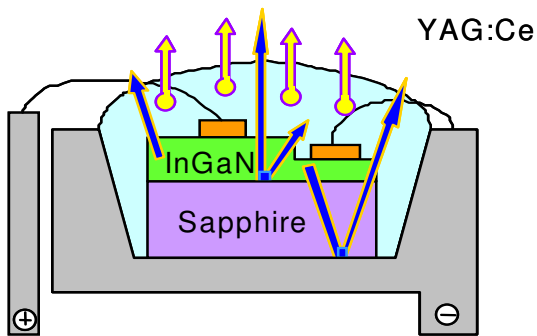


White LED 시판품

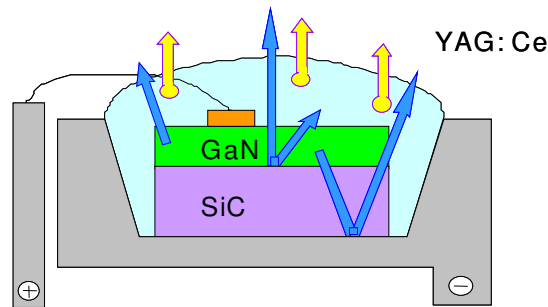
상용화된 White를 만드는 3가지 방법
 → Sumitomo 방식 white 조사

Nichia



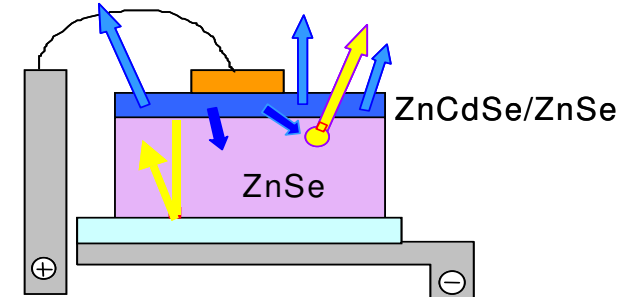
- 청색 InGaN LED + 황색 YAG:Ce
- 발광 효율: 15 lm / W

Osram



- SiC-base 청색 InGaN LED + 황색 YAG:Ce
- Particle size <math>< 20\mu\text{m}</math>
- 발광 효율: 10 lm / W

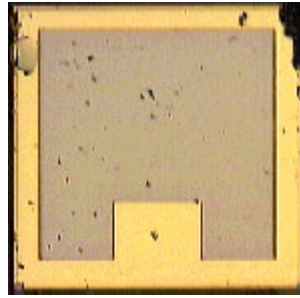
Sumitomo



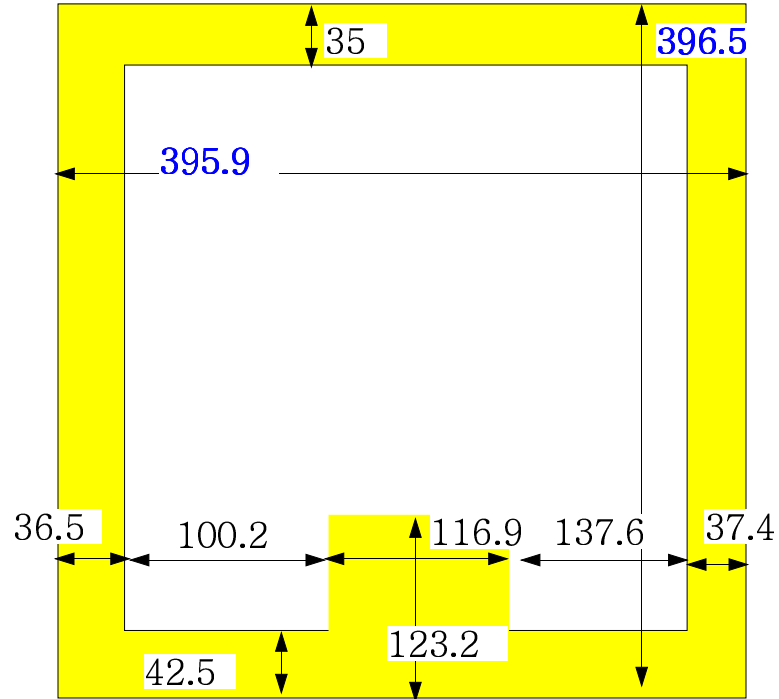
- ZnCdSe/ZnSe 활성층의 청색 + ZnSe 기판에서 나오는 황색 PL
- 도전성 ZnSe 사용하여 소자 구동전압 감소: 2.7 V
 → 휴대폰용 back light에 적합
- 발광 효율 : 8 lm / W

Sumitomo ZnCdSe White

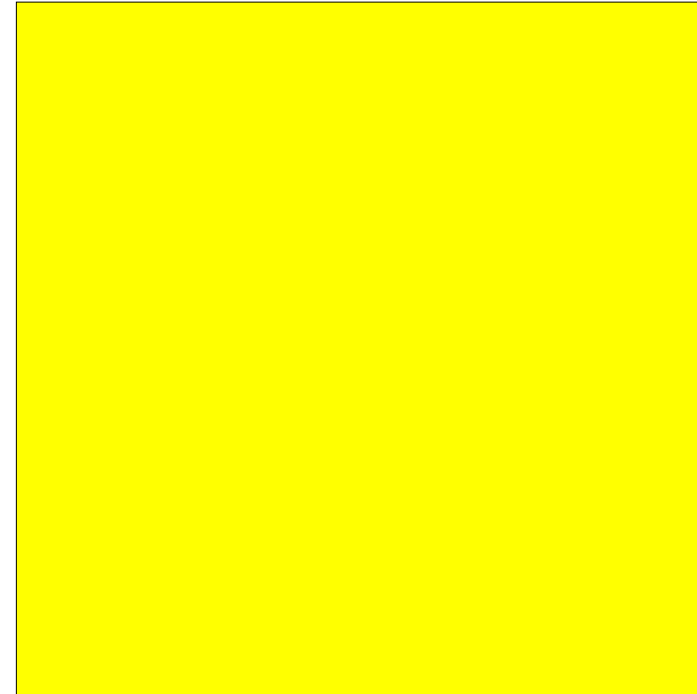
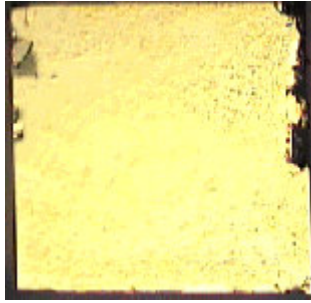
1.chip size 측정



p front side

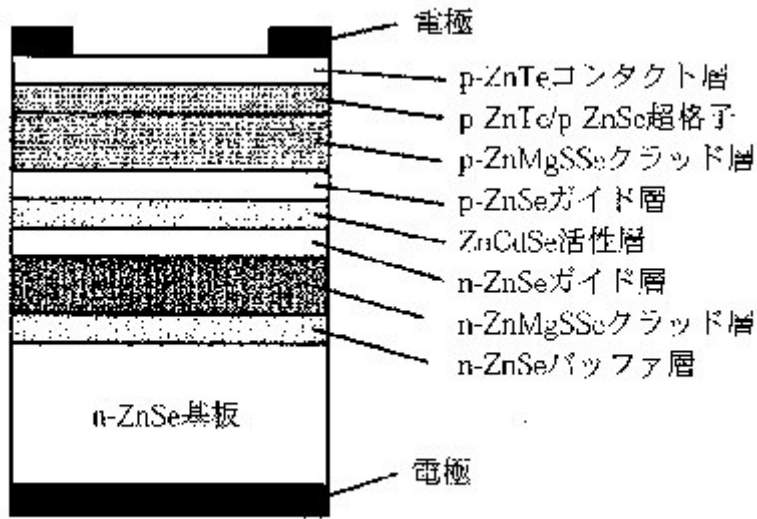


n back side



측면



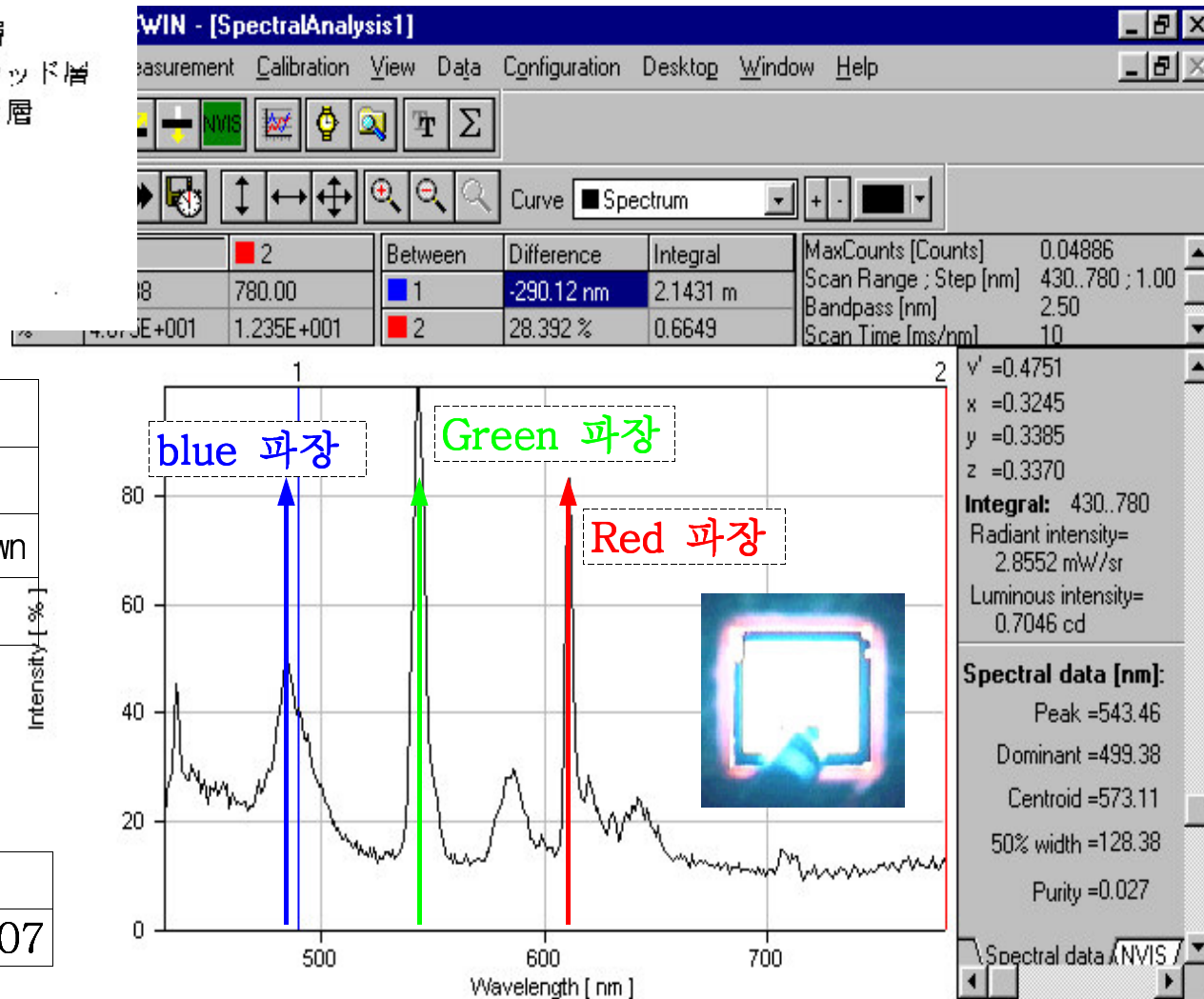


(c) ZnCdSe-白色LED

	bias	비고
V_f (@ 10uA)	2.07 V	
V_r (@-10uA)	-44 V	hard breakdown
V_f (@ 5mA)	2.45 V	

u'	v'	x	y	z
0.202	0.4774	0.3268	0.3425	0.3307

2.Spectrum analyzer 측정

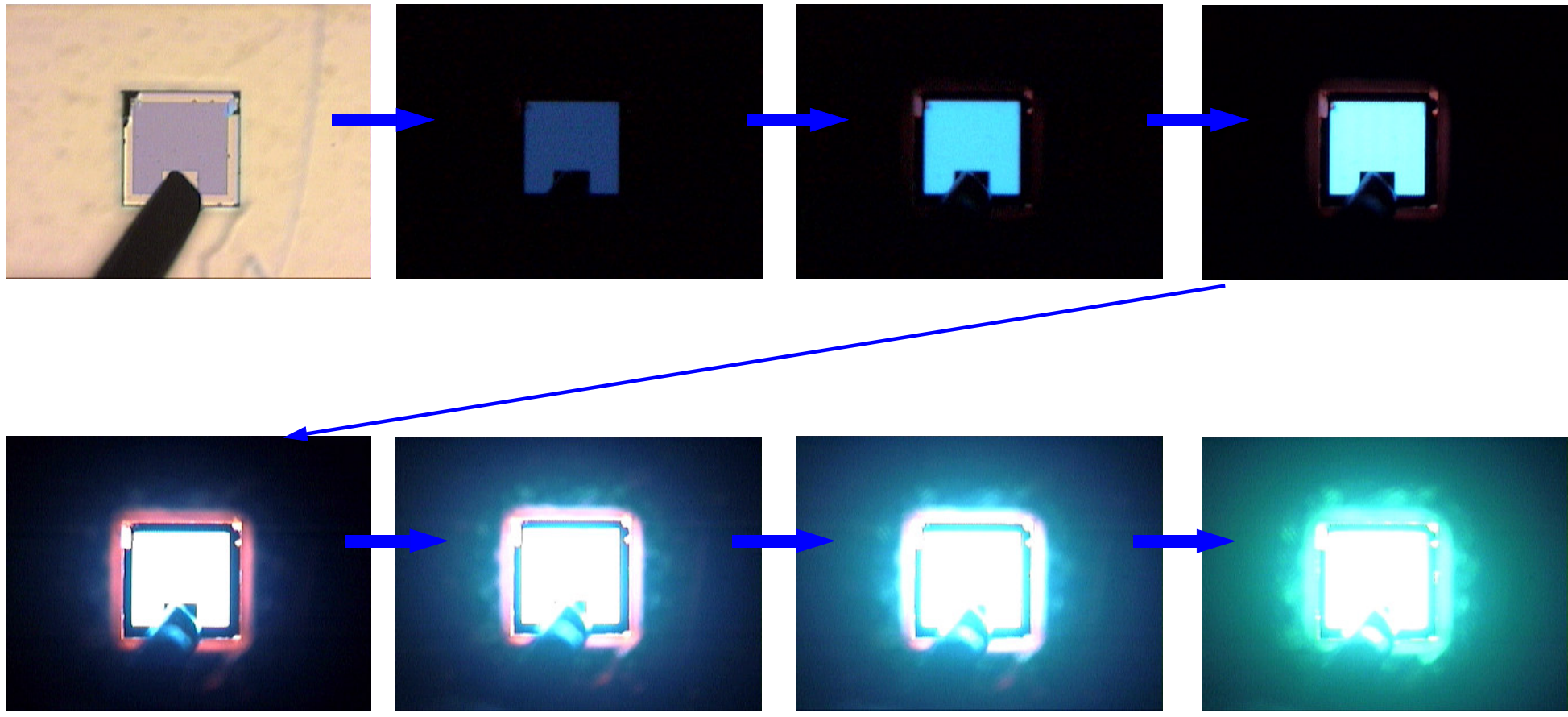


3. 발광 사진

x50

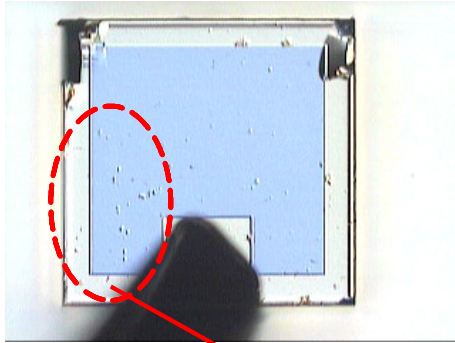
without current

with current → 점차적으로 전류를 증가 시킴.

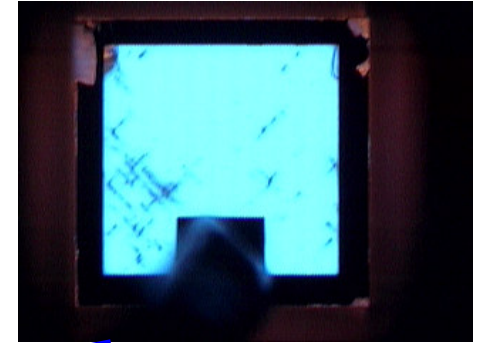


4. 발광 사진 x100
p-wire bonding 면

without current

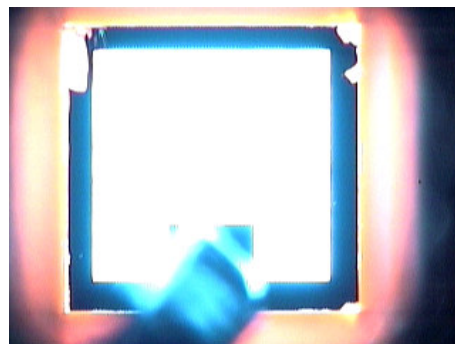
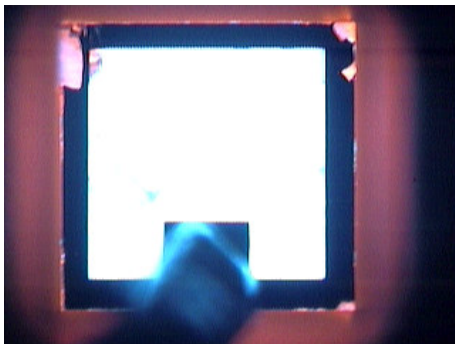


with current → 점차적으로 전류를 증가 시킴.



low current에서는 청색 발광만 함.

발광시 defect로 작용하여 비 발광 함.

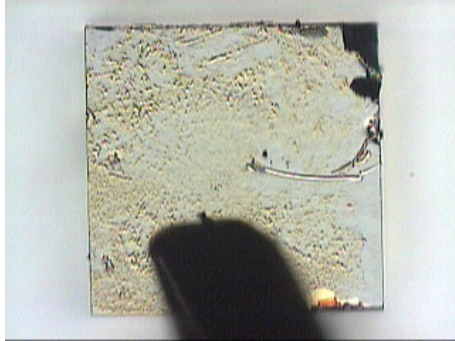


current가 증가 함에 따라서 ZnSe 기판에 여기한 Yellow PL과 함께 white가 나옴

5. 발광 사진 x100

n-die면

without current

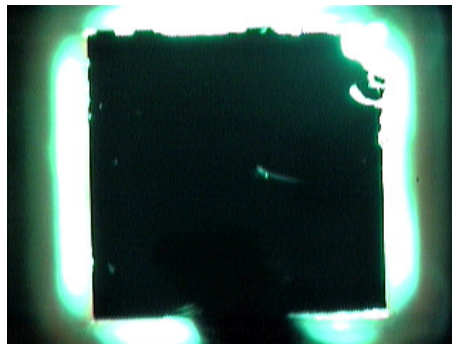
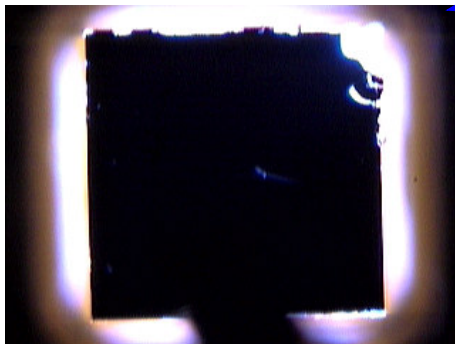


with current → 점차적으로 전류를 증가 시킴.

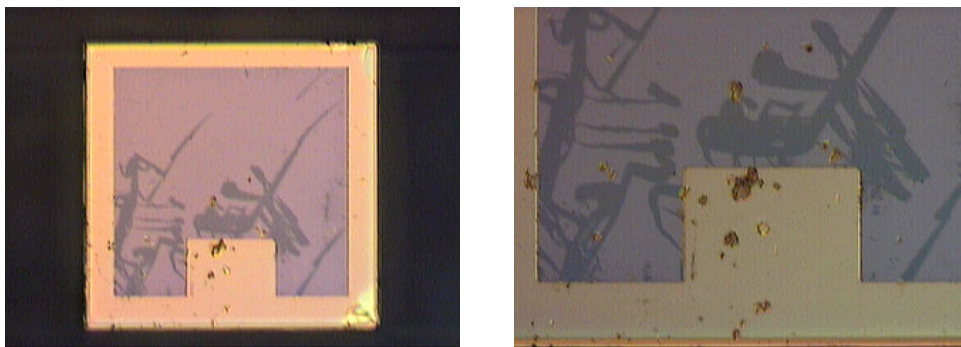
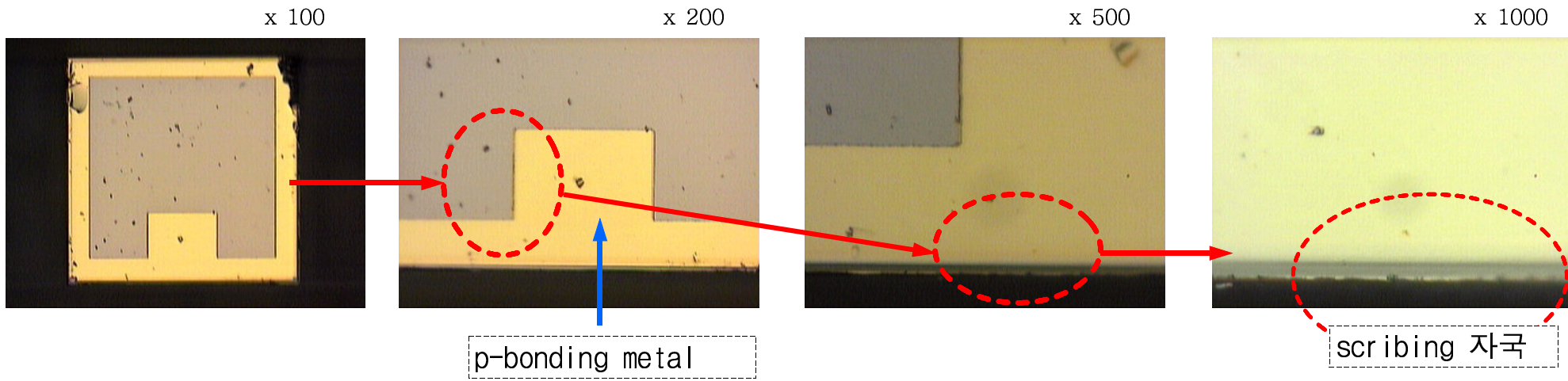


n-die bonding면 쪽에서 발광모양을 관찰함.

→ n-side contact metal이 전면 증착되어 있으므로 측면에서만 발광을 관찰 할 수 있음

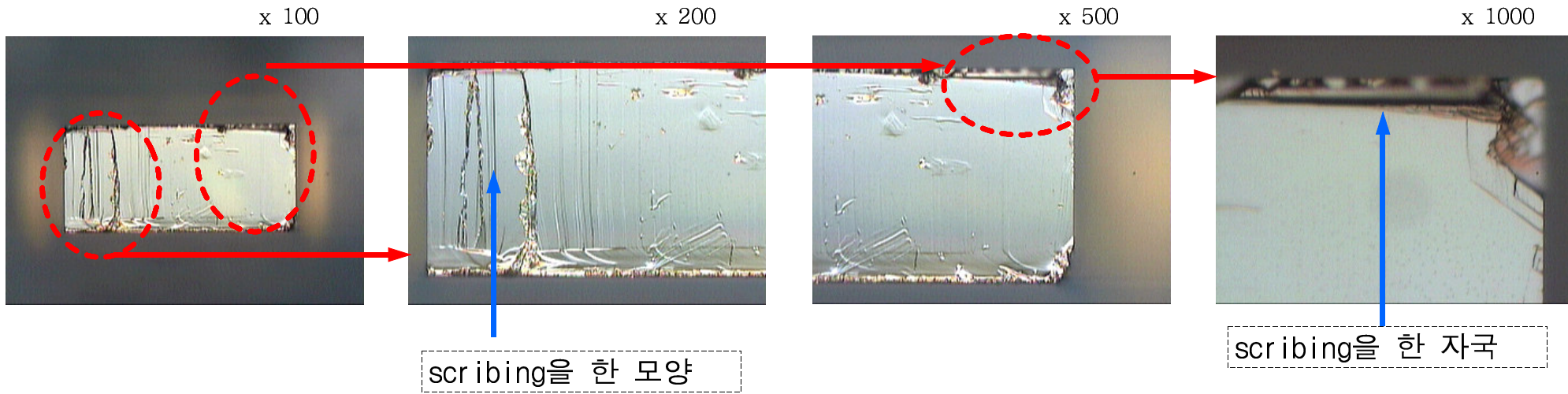


6.p-front side



Semi-transparent metal에
scratch가 있는 모양

7.측면



8.n-side

