

MICRO-SCALE CHARACTERIZATION OF PERC UNDER THE MANUFACTURING PROCESS BY PHOTO-LUMINESCENCE

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MOTIVATION

To measure Photo Luminescence intensity at small area

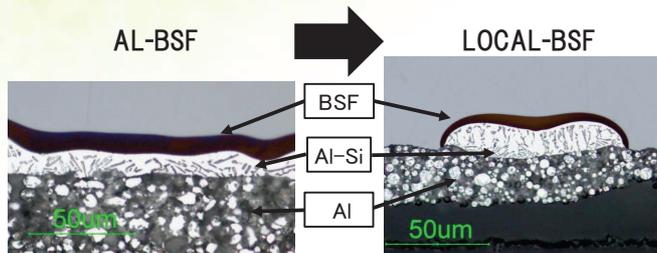
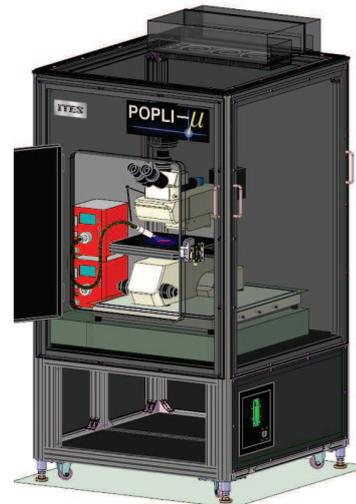


Figure 1. Microscope photograph of Cross-section

- PERC structure with passivated rear side
- To inhibit rear surface recombination velocity
- Micro scale electrode structure

APPROACH

Microscopic Photo-Luminescence Analysis



- Excitation Source
 - Laser Diode
 - 850 nm
 - 15W Output power
- Camera
 - Cooled CCD
 - 1024x1024 pixels
 - >960 nm
- Microscope
 - IR objective lens
 - x5, x10, x20

Figure 2. Microscopic PL system

METHODS and RESULTS

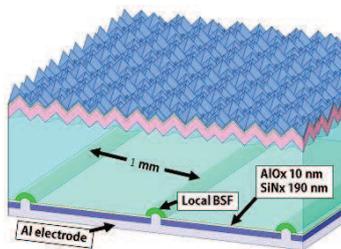


Figure 3. PERC sample

- Sample preparation
 - Diffusion in front side
 - SiNx on front side
 - AlOx and SiNx on rear side
 - Laser contact opening
 - Thermal annealing
 - Fire through

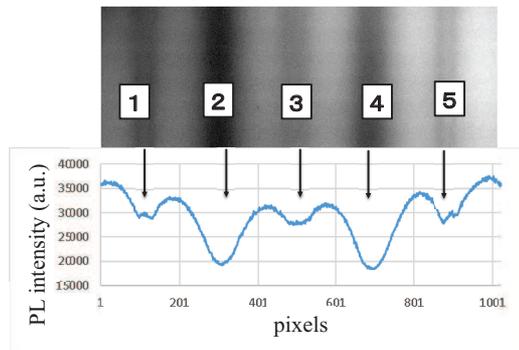


Figure 4. Microscopic PL image (upper photo)
PL line profile after baseline correction (lower)

- PL measurement result
 - Two levels of PL intensity at local BSFs

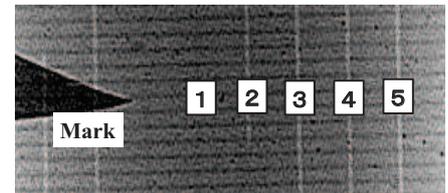


Figure 5. X-ray photograph

- X-ray transmission result
 - Light gray lines mean higher X-ray transmittance
 - Little dark gray line (#1) means lower X-ray transmittance
 - The X-ray result is not equal to the PL result

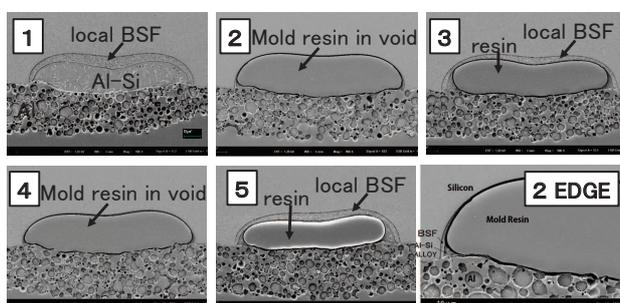


Figure 6. Cross section SEM photograph

Table 1. Results of local BSF Analysis

local BSF number	1	2	3	4	5
thickness of local BSF (μm)	4	0.2	2	0.2	2.5
PL Intensity (a.u.)	2.9	1.9	2.8	1.9	2.9
Void		✓	✓	✓	✓
X-ray check	○	×	×	×	×