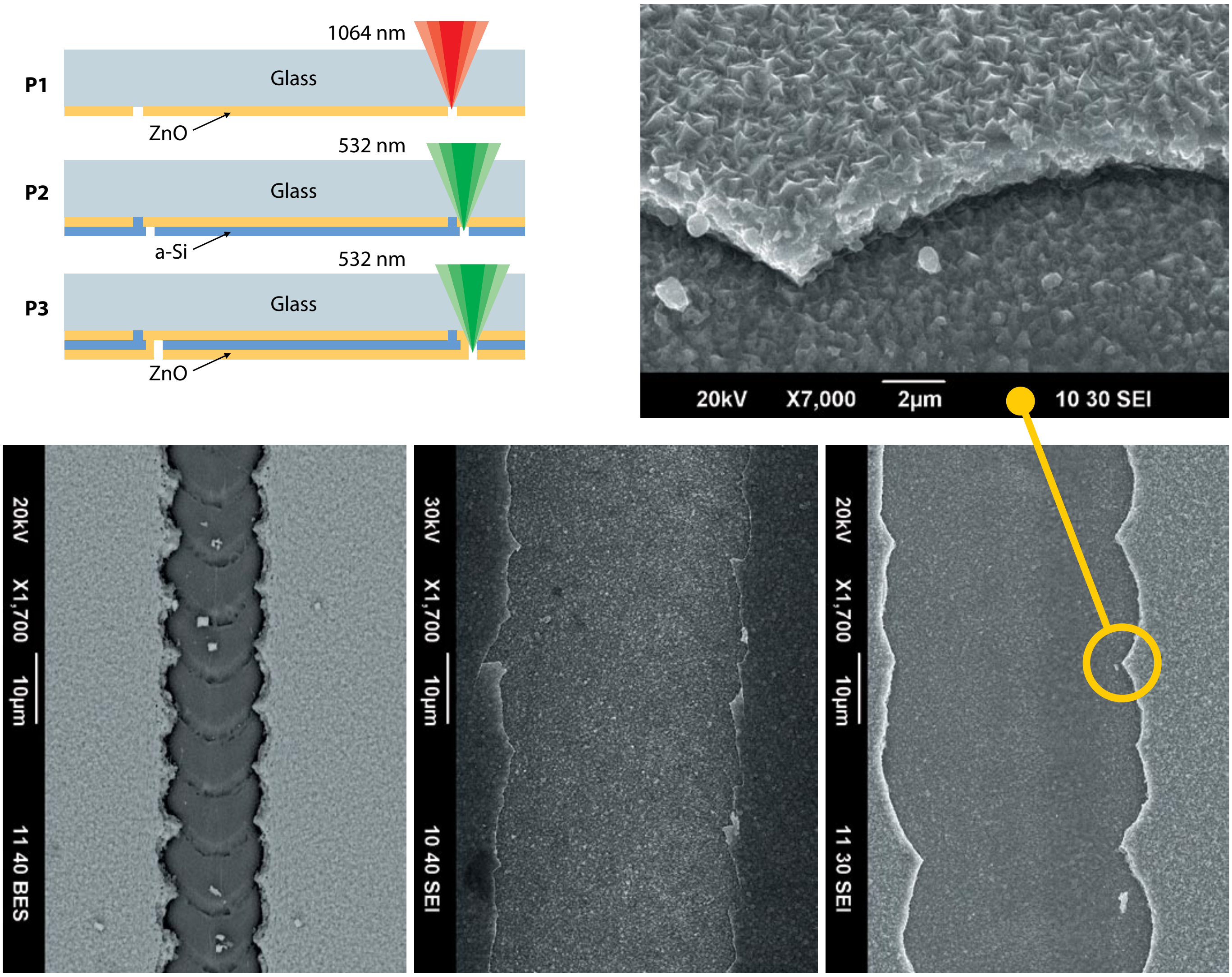
SCRIBING OF a-Si THIN-FILM SOLAR CELLS WITH ATLANTIC LASER

Permanent growth of the thin-film electronics market stimulates the development of versatile technologies for large scale patterning of thin-film materials on rigid and flexible substrates. Efficiency of the thin-film solar cells with a large active area might be maintained if small segments are interconnected in series in order to reduce photocurrent in thin films and resistance losses. Laser scribing is an important step to preserve high efficiency of photovoltaic devices on large areas.

The picosecond laser Atlantic was used to scribe the thin-film layers in ZnO/a-Si/ZnO/glass solar cells. The laser beam was focused through the glass substrate to the solar cells layers as shown in picture below.



P1, 1064 nm, 0.8 W, 100 kHz, 800mm/s

P2, 532 nm, 200 mW, 100 kHz, 900mm/s

P3, 532 nm, 400 mW, 100 kHz, 900mm/s

Fig. 1. Laser back side scribing of Thin-film Solar cells with Atlantic laser

The laser radiation was coupled at the corresponding interface between layers depending on wavelength of laser radiation resulting in clean removal of adjusted films in the P1, P2 and P3 processes for interconnect formation. Smoothening of the scribe edges can be achieved by optimization of the beam profile and spot overlap.