



Optimization of subwavelength features by Nanoimprint Lithography for large-scale nanostructured solar modules

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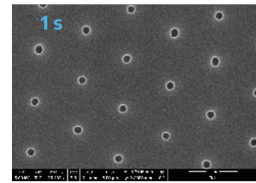
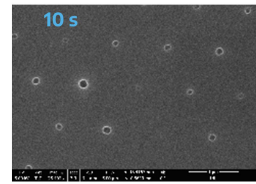
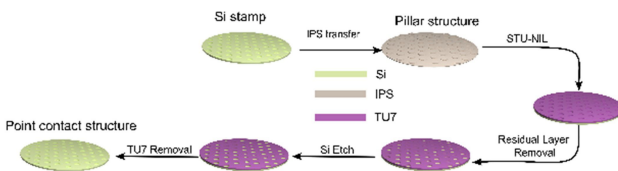
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MOTIVATION

For the current environmental concerns, the reduction of the materials used is very appreciated. In the Nanoimprint Lithography (NIL) process, we reduced the deposition time of an anti-sticking layer (ASL) of the stamp used from 10 s to 1 s, and found a beneficial impact for patterning low-dimension features (100 nm).



NIL PROCESS AND ASL

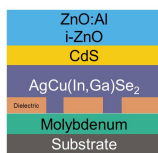


For NIL, optimised ASL are crucial for lower size features, preventing poor-quality pattern transfer.

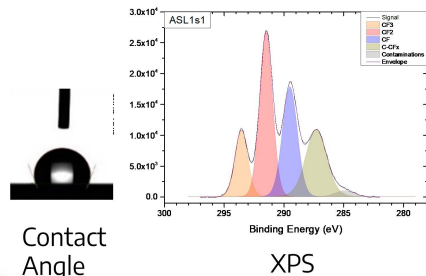
NIL PERFORMANCE

Our NIL process provides PV cells with similar efficiency values compared to the ones from the standard EBL¹.

	V_{oc} (mV)	J_{sc} (mA/cm ²)	FF (%)	Efficiency (%)
EB L	744±3	24.0±0.3	68.6±2.7	12.3±0.5
NIL	730±2	21.7±0.5	79.2±0.6	12.6±0.4



ASL PROPERTIES



CONCLUSIONS

NIL-nanostructured devices had similar performance compared to EBL ones. Our ultrathin ASL allows imprinting very small features, but optimization of the ultrathin ASL layer (1 s) lifetime is required.

¹T.S.Lopes et al., "Cu(In,Ga)Se₂ based ultrathin solar cells: the pathway from lab rigid to large scale flexible technology," (submitted)

