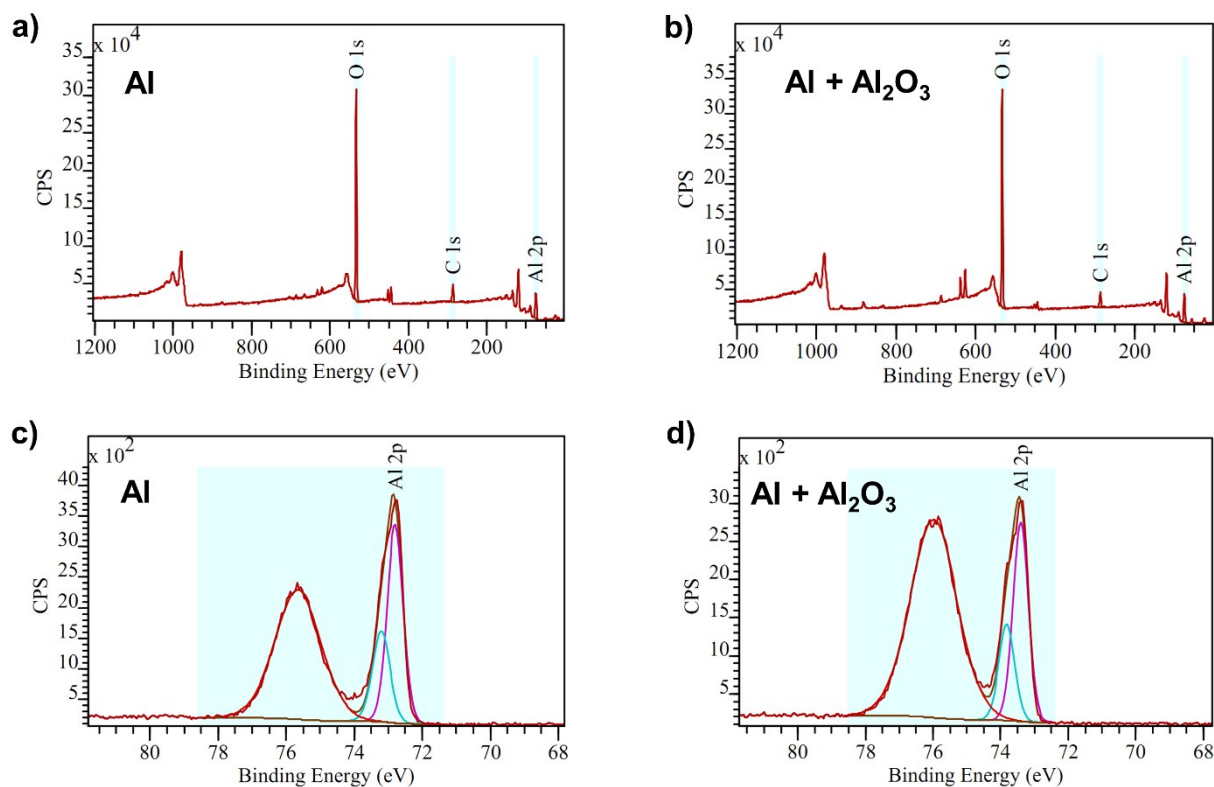
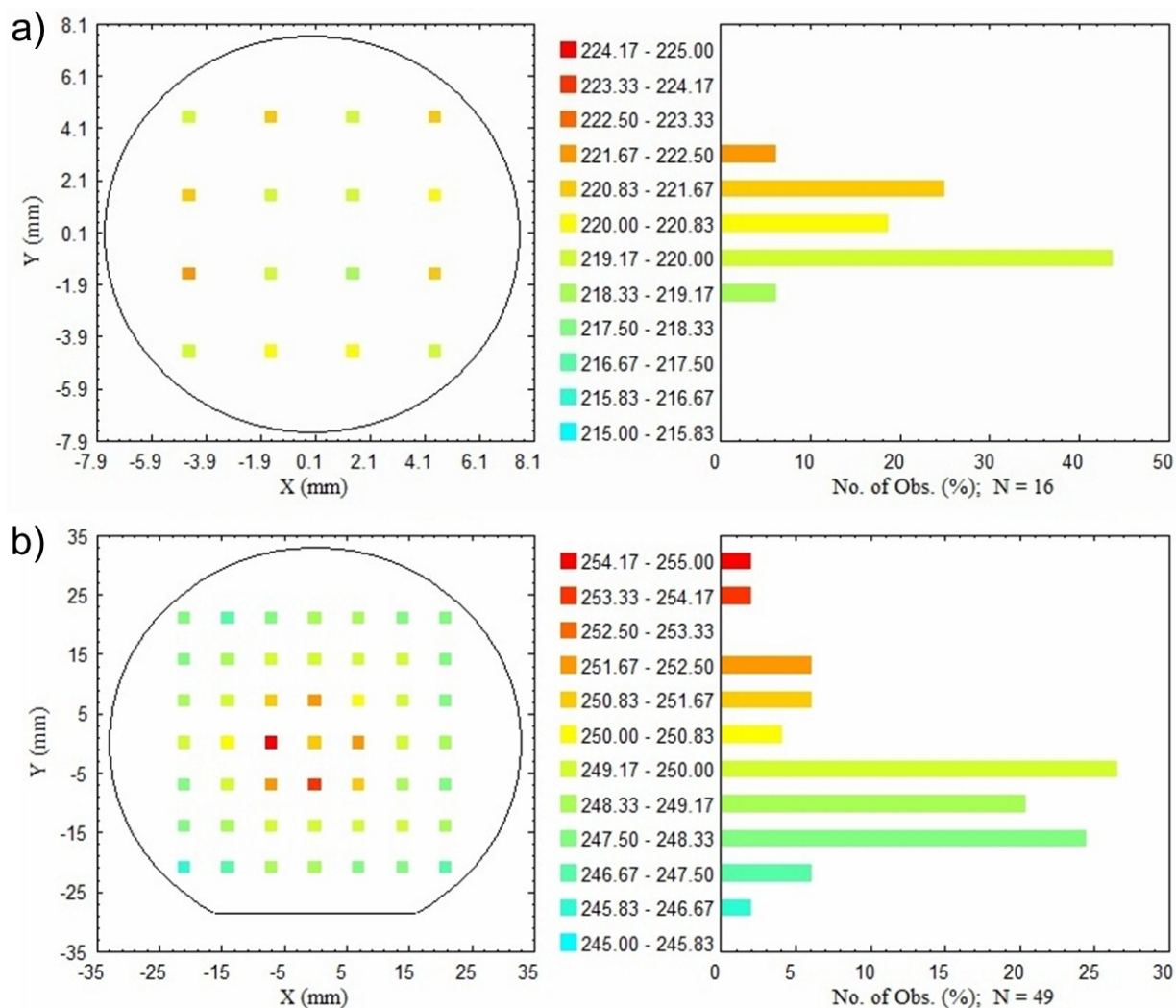


Supplementary information



S.I. Figure 1 X-ray photoelectron spectroscopy (XPS) spectra for (a) Al grid lines and (b) Al grid lines after 15 min of exposure to an UV-ozone plasma. (c) and (d) show a zoom of the region where the Al peaks are situated. The XPS data demonstrates the Al lines were already partially oxidized during the mounting of the sample and the exposure to air. The plasma treated Al lines still displayed a higher degree of oxidation and higher Al₂O₃ concentration. This indicates that the Al surface is very reactive and the plasma treatment can create a passivation layer.



S.I. Figure 2 Thickness distribution measured by optical reflectance for spin coated $\text{CH}_3\text{NH}_3\text{PbI}_3$ films on (a) 2.5 cm x 2.5 cm and (b) 6 cm x 6 cm glass/ITO substrates. For the small area substrate there is very little thickness variation (220 ± 2 nm) over an area of around 0.7 cm^2 , which is larger than the active area of the devices (0.2 cm^2). The large area substrates show a clear radial distribution of the thickness over an area of 16 cm^2 with around 255 nm in the center of the substrate and around 245 nm at the outside.