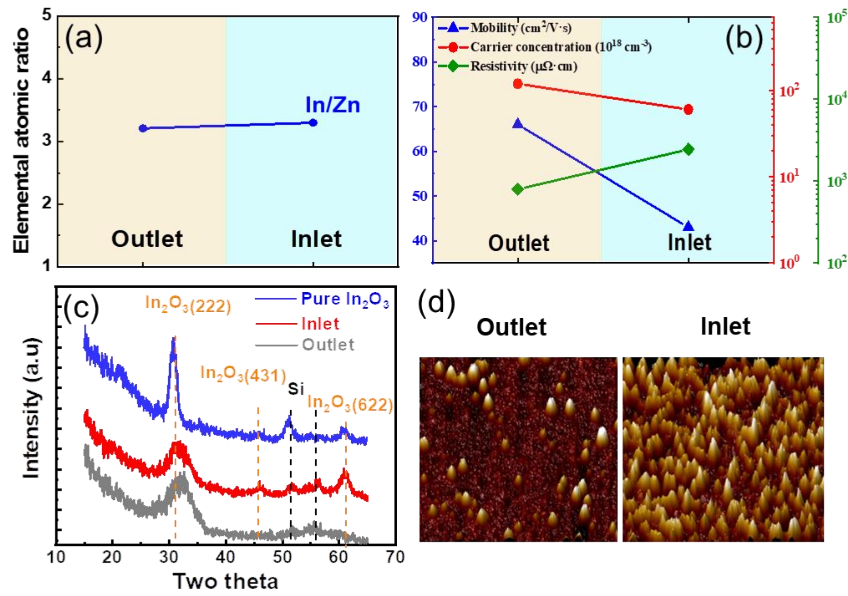

Figure1. (a-b) The material characterization results detected by X-ray photoelectron spectroscopy (XPS) and Hall Effect Measurement System. Although there is no obvious difference in In/Zn atomic ratio between outlet and inlet samples, the electricity property of the inlet sample was significantly degraded: the mobility decreased from 66 $cm^2/V·s$ to 43 $cm^2/V·s$, and the carrier concentration decreased from 1.19 x 10^{20} cm^{-3} to 6 x10^{19} cm^{-3}. (c) XRD results of IGZO/Al_2O_3/IZO film stack. Besides $In_2O_{3(222)}$ which can only be found in outlet region IZO film, additional two peaks, i.e. $In_2O_{3\ (622)}$ and $In_2O_{3\ (431)}$, can be found from inlet sample XRD spectra. In other words, the crystallinity of inlet IZO is very similar that of pure In_2O_3. We deduced that there may be pure In_2O_3 in inlet IZO, and inlet IZO is inhomogeneous thin film. (d) AFM results of IZO films deposited at outlet and inlet position. AFM image of inlet sample shows a rougher surface, also confirm this conclusion.