Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C

Supplementary information

Φ-scans of samples not presented in the manuscript

Fig S1 shows ϕ-scans that follow the discussion in relation to Fig 8 in the main manuscript, proving the proposed epitaxial relationships.

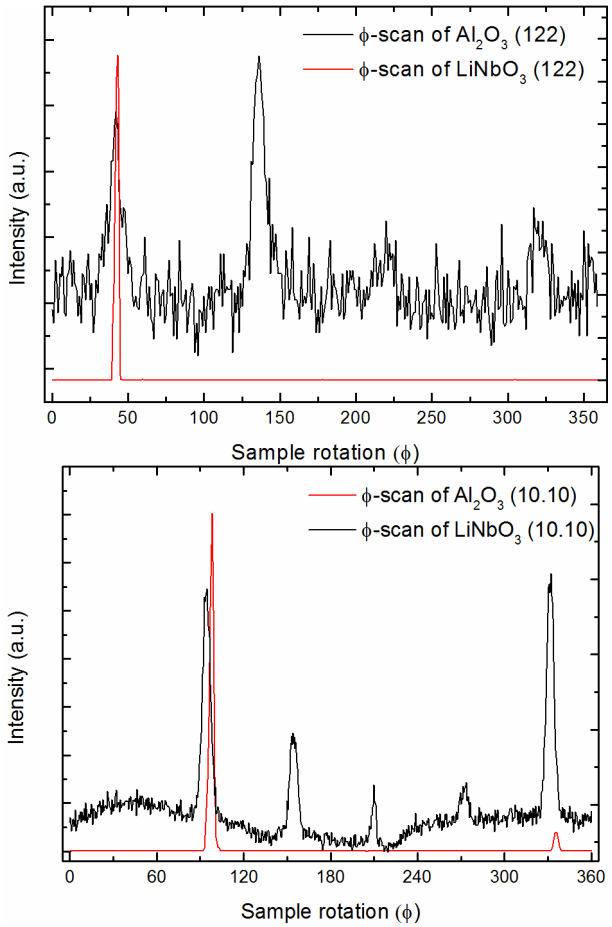


Figure S1 ϕ-scans of the (122)- and (10.10)-reflections of samples deposited on Al_2O_3 r- (top) and c- (bottom), respectively. The samples are deposited using 666-cycles of 2:1 pulsing ratio of Nb:Li, and annealed at 650°C for 15min.

Williamson-Hall analysis

Fig S2 shows the Williamson-Hall analysis conducted from the (012), (024), (036) and (048) reflections of $LaAlO_3$ and r-Al_2O_3. The corresponding particle sizes are XX and YY, respectively.

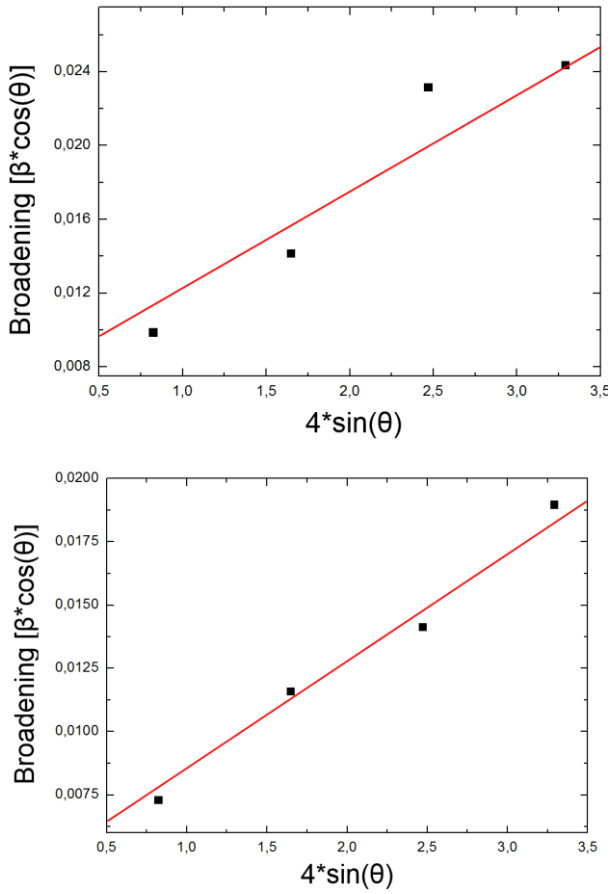
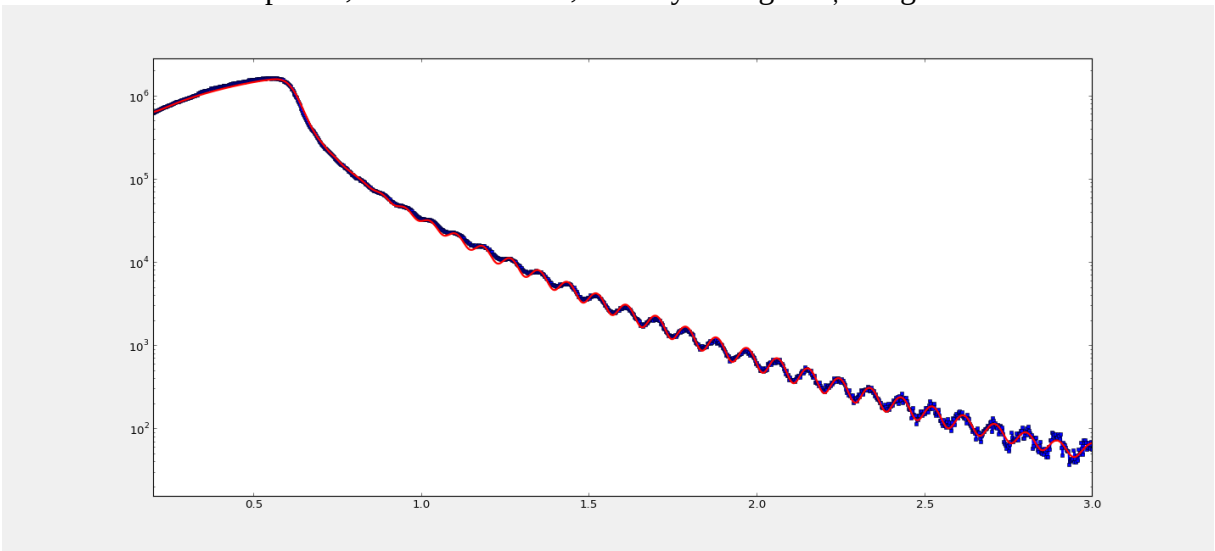


Figure S2 Williamson-Hall-plots of samples deposited on r-Al_2O_3 (top) and $LaAlO_3$ (bottom), the data points are fitted to a straight line and the particle sizes corresponds to XX and YY. The samples are deposited using 666-cycles of 2:1 pulsing ratio of Nb:Li, and annealed at 650°C for 15min.

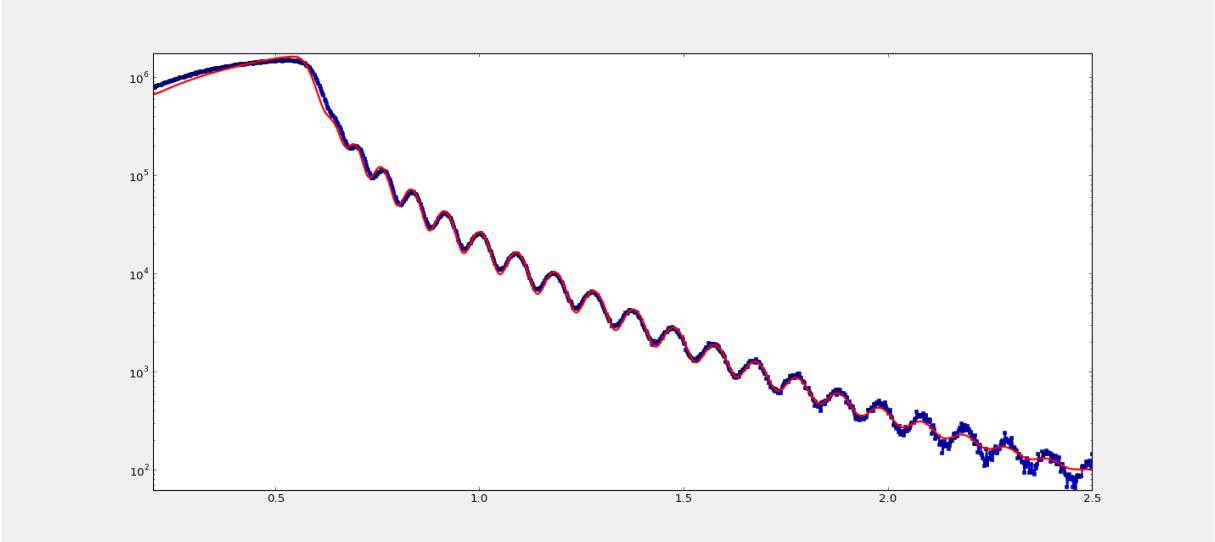
X-ray reflectivity analysis

The figures below show the fitted data (red lines) and experimental values (blue dots) for samples with varying composition, corresponding to the reported values in fig 3 in the paper. The data is fitted to a model consisting of a silicon substrate, the film and a surface layer of Li_2CO_3. The samples deposited using 50 % and 26.7 % lithium pulses are not shown, as these samples could not be fitted due to high roughness or non-uniformity.

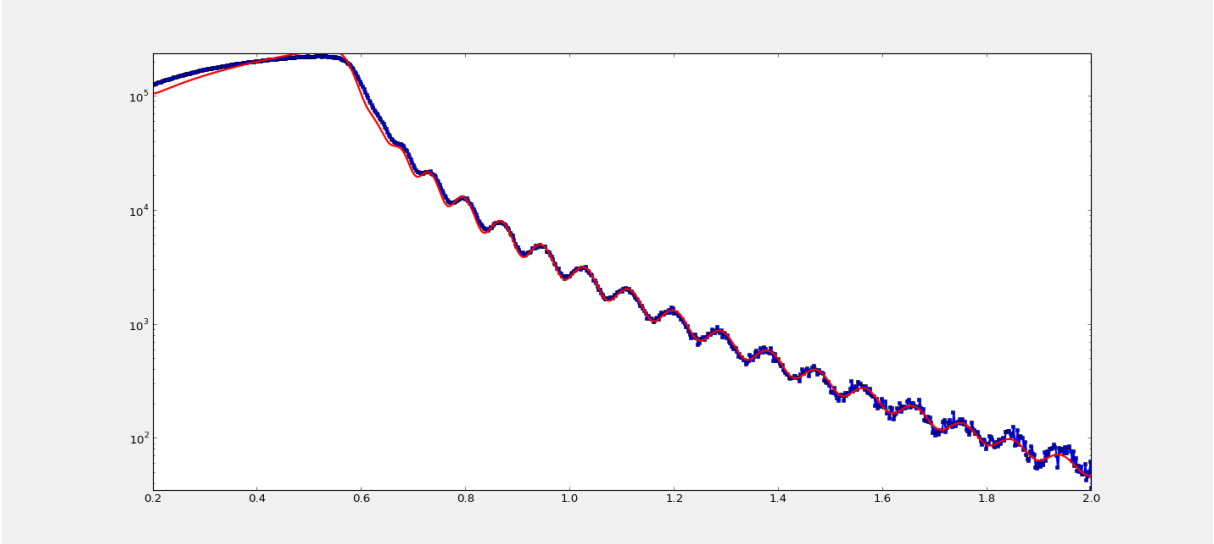
Pulsed ratio: 0 % Li-pulses, Thickness 921Å, Density 4.68 g/cm^3, Roughness 11Å



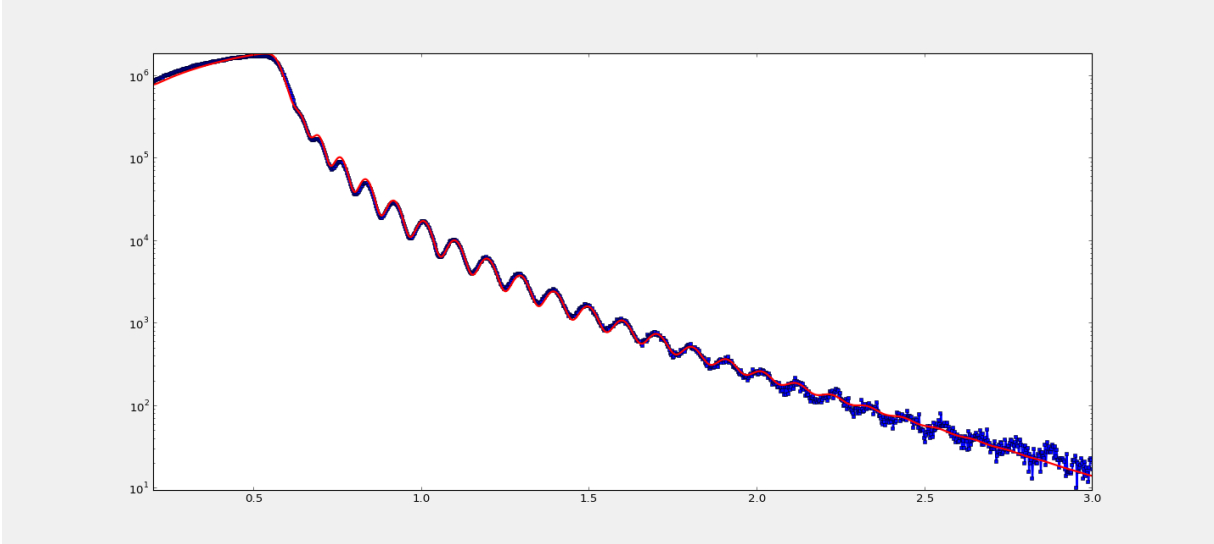
Pulsed ratio: 10 % Li-pulses, Thickness 808Å, Density 4.17 g/cm^3, Roughness 16Å, Top layer, 7.7Å



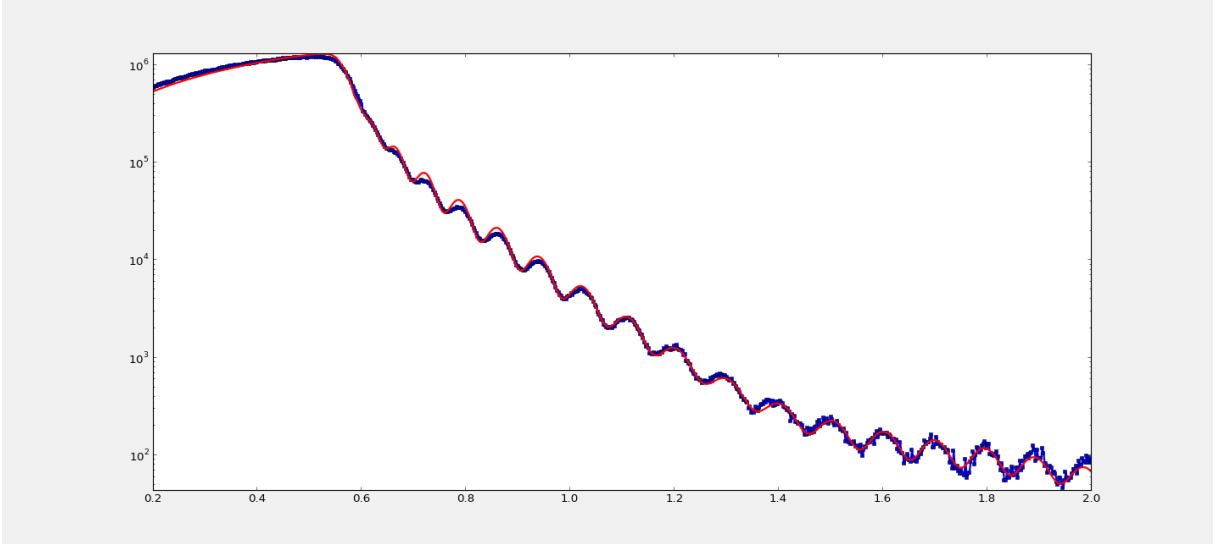
Pulsed ratio: 16.67 % Li-pulses, Thickness 878Å, Density 4.12 g/cm^3, Roughness 7Å, Top layer, 15Å



Pulsed ratio: 20 % Li-pulses, Thickness 800Å, Density 4.08 g/cm^3, Roughness 7.8Å, Top layer, 6Å



Pulsed ratio: 25 % Li-pulses, Thickness 866Å, Density 3.92 g/cm^3, Roughness 11Å, Top layer, 30Å



Pulsed ratio: 33 % Li-pulses, Thickness 1202Å, Density 3.92 g/cm^3, Roughness 19Å, Top layer, 33Å