Supplementary Information

In-plane (Δϕ) and out-of-plane (Δω) texture data for the samples processed at various temperatures and relative humidity.

Substrate texture

Δω, Ni (002) Phi = 0º	Δω, Ni (002) Phi = 90º	Δϕ, Ni (111)
9.29	5.62	6.6

Temperature = 900ºC

RH (%)	Δω, LZO (004) Rolling direction	Δω, LZO (004) Transverse direction	Δϕ, LZO (222)
10	5.94	3.96	6.28
20	5.02	4.08	6.09
30	5.17	3.81	6.27
40	5.16	4.57	6.4
50	4.77	3.44	5.93

Temperature = 1000ºC

RH (%)	Δω, LZO (004) Rolling direction	Δω, LZO (004) Transverse direction	Δϕ, LZO (222)
10	5.39	3.78	6.18
20	5.74	4.16	6.2
40	5.27	3.84	6.33
60	5.4	3.8	6.63
80	5.39	3.76	6.77

Temperature = 1100ºC

RH (%)	Δω, LZO (004) Rolling direction	Δω, LZO (004) Transverse direction	Δϕ, LZO (222)
10	6.04	4.2	5.9
20	7.71	5.09	6.42
30	5.6	3.8	5.87
40	7.51	4.73	6.64
50	5.37	3.74	6.63
60	6.72	4.39	6.7
80	4.23	3.11	5.98

Calculation of % Random Orientation

The LZO (222) peak is an indicator of randomly oriented fraction of the film. The LZO (400) peak consists of components from both the randomly oriented fraction and the epitaxial fraction. The contribution of the randomly oriented fraction to the (400) peak can be calculated from the LZO (222) peak and the intensity ratios from the powder diffraction file for LZO (#71-2363).

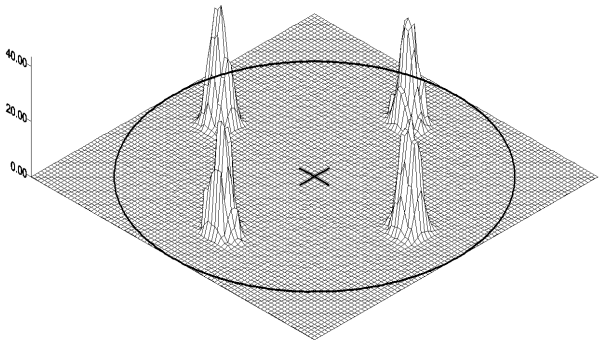
Area under LZO (222) peak = A_r

Area under LZO (400) peak = A_{total}

Random component of A_{total} = A_r * 29.6/100 = A_{random}

% Random orientation = A_{random}/A_{total} * 100

Calculation of % Cube texture



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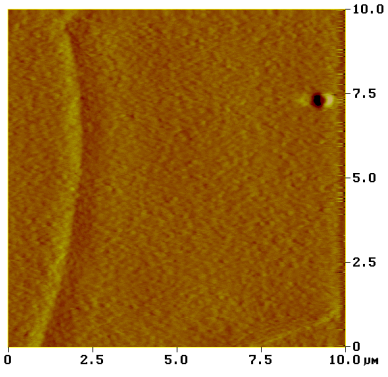
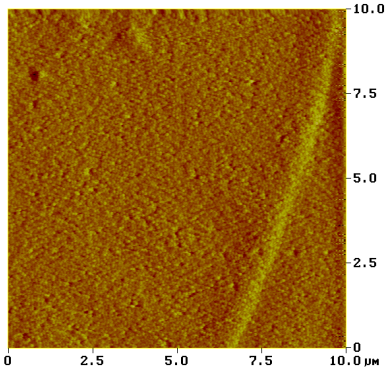
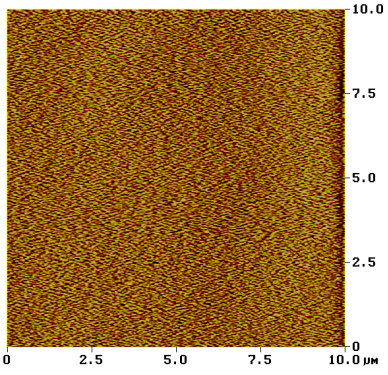
The difference is taken between a pole figure measured at the Bragg angle of the LZO (222) reflection and a background pole figure offset by 1 degree in 2θ. This background-corrected pole figure is plotted in an equal-area projection. It is normalized so that the integral over the hemisphere $0<\chi<90$ is 1. For cube-textured LZO, the (222) reflections are ideally at four orientations: $\chi=35°$, $\phi=\phi_i$ where ϕ_i is one of {0,90,180,270}. The fraction of cube textured LZO is measured by integrating the region of the pole figure which falls within $D<1$ of any of any ideal orientation, where

$$D = \left[\frac{(\chi - 35^\circ)^2}{A^2} + \frac{(\phi - \phi_i)^2}{B^2} \right]^{1/2}$$, with A=25° and B=35°.

AFM scans of samples processed at RH = 40% (SEM provided in Fig. 6 of the manuscript)

		
Temperature = 900ºC, RH = 40% R_a = 0.37 nm	Temperature = 1000ºC, RH = 40% R_a = 1.21 nm	Temperature = 1100ºC, RH = 40% R_a = 1.95 nm