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# Fabrication of c-axis LiNbO<sub>3</sub> Thin Film for Surface Acoustic Wave Applications



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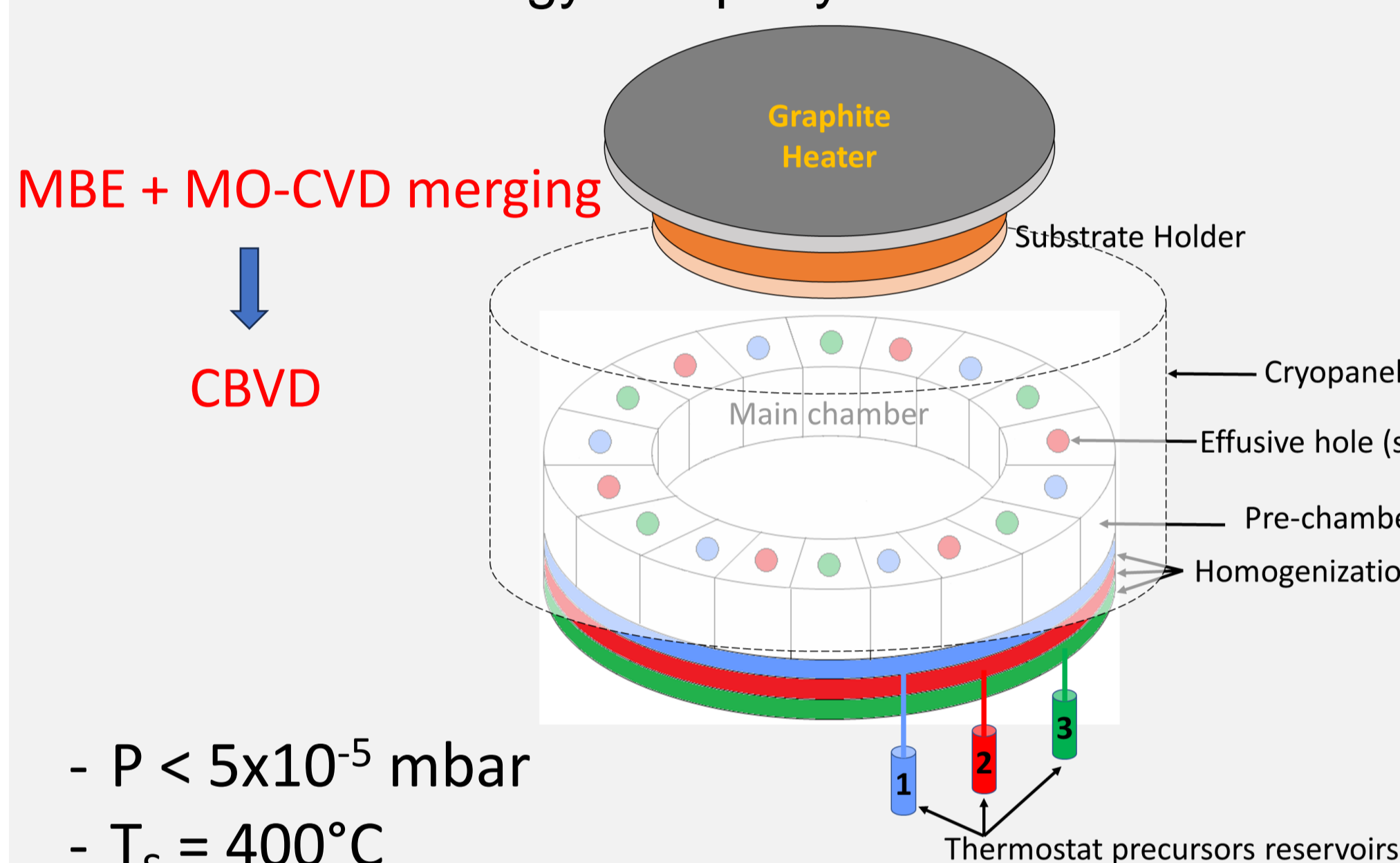
<sup>3</sup> INL - Institut des Nanotechnologies de Lyon, Université de Lyon, Ecole Centrale de Lyon, CNRS, UMR5270, 69134 Ecully, France

## Objective

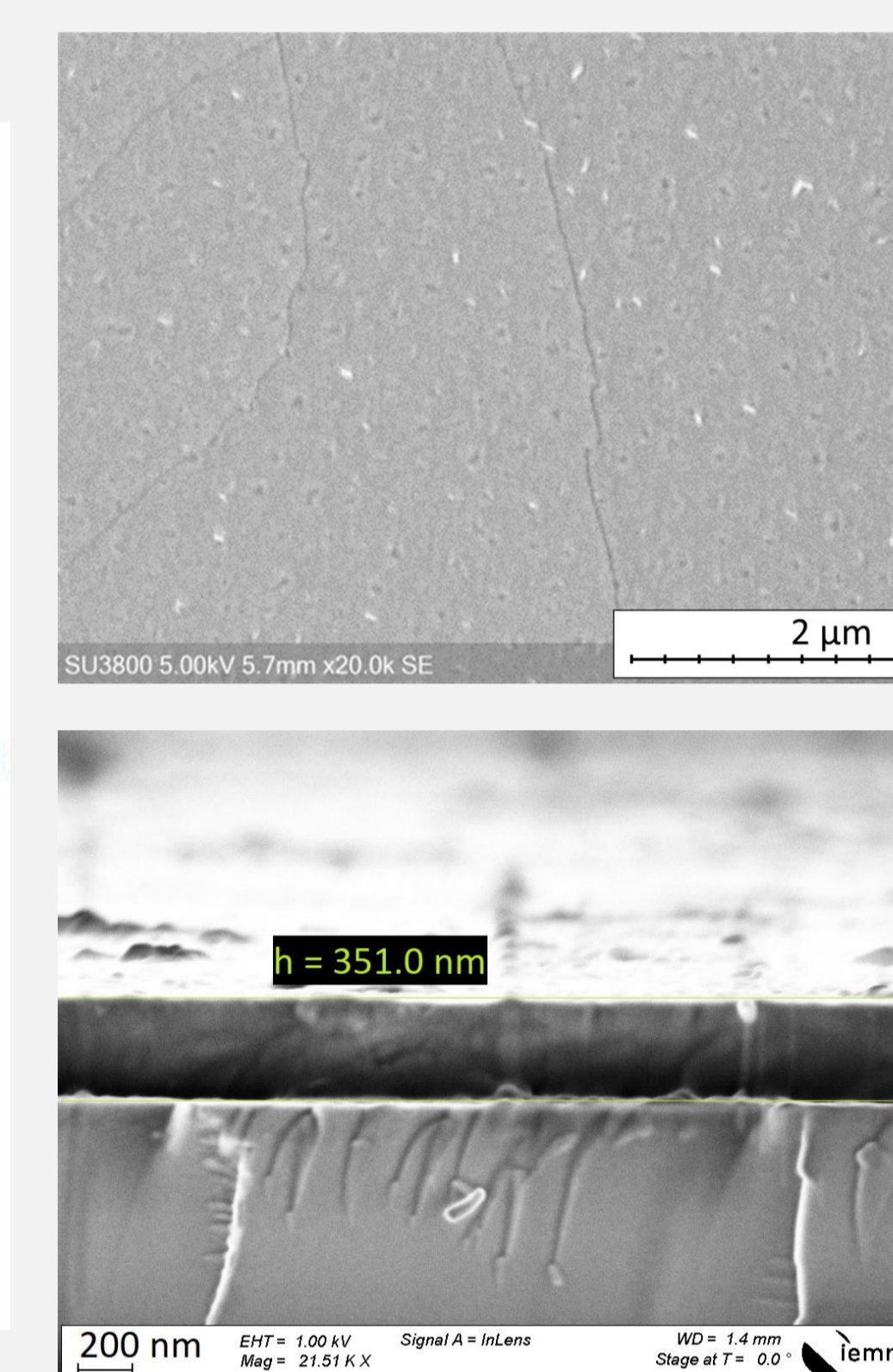
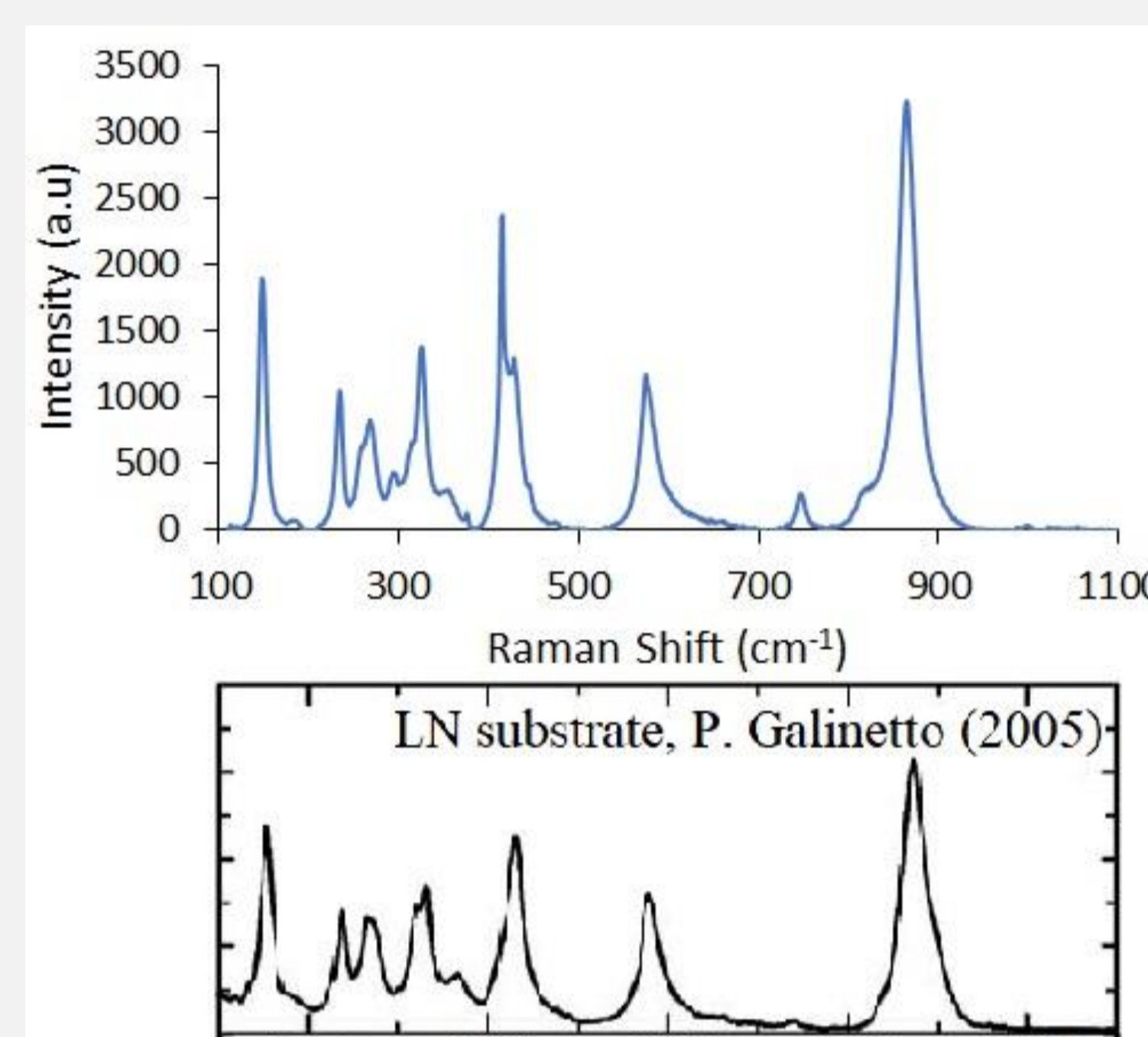
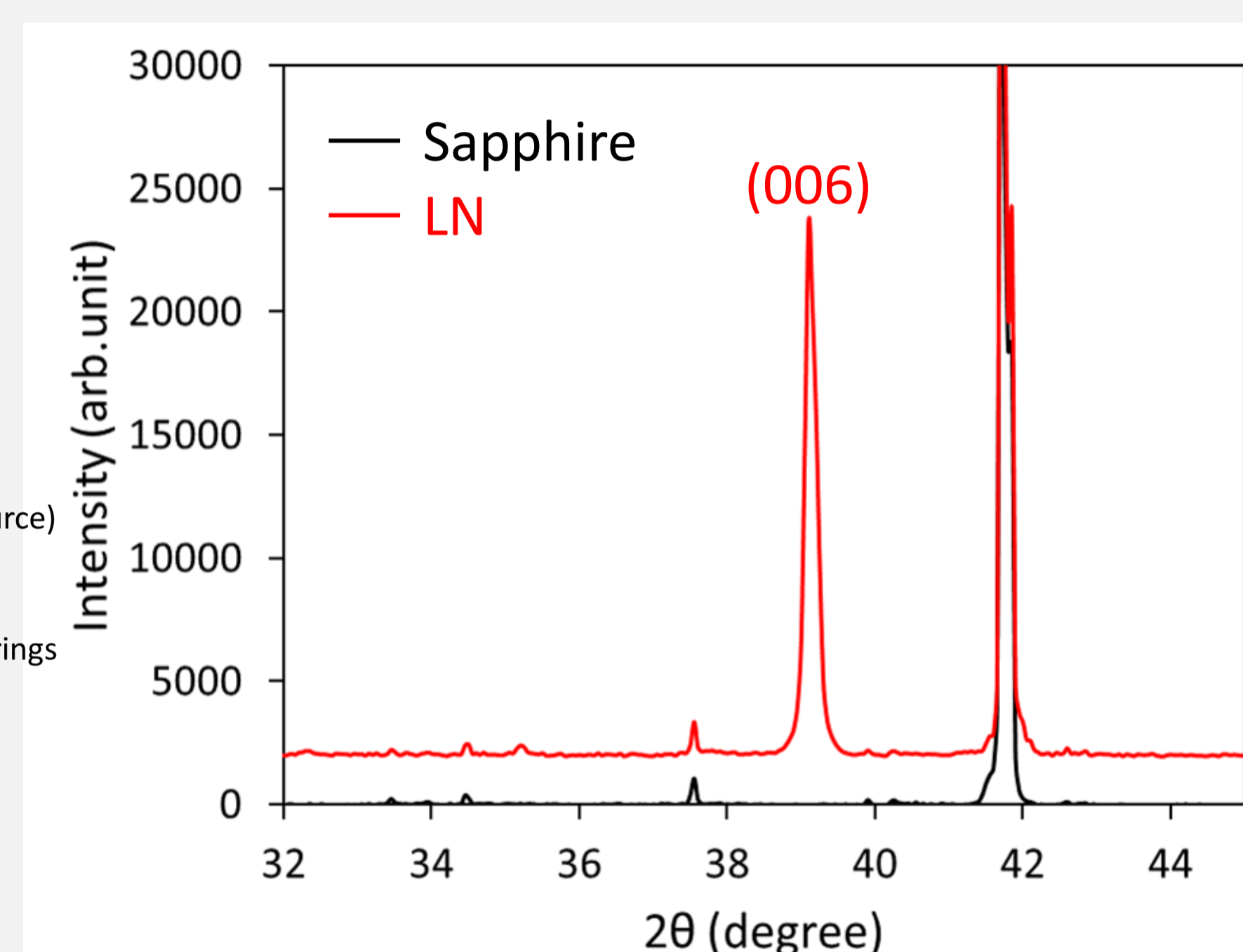
Lithium niobate (LN) is an important dielectric and ferroelectric materials, which are widely used in acoustics, optic, and optoelectrical devices. In this study, LN thin film was deposited by CBVD method. A SAW delay line and a one-port resonator were fabricated by an e-beam lithography process to investigate the acoustic properties.

## LN thin film deposition and Characterization

Sybilla deposition equipment from ABCD Technology company

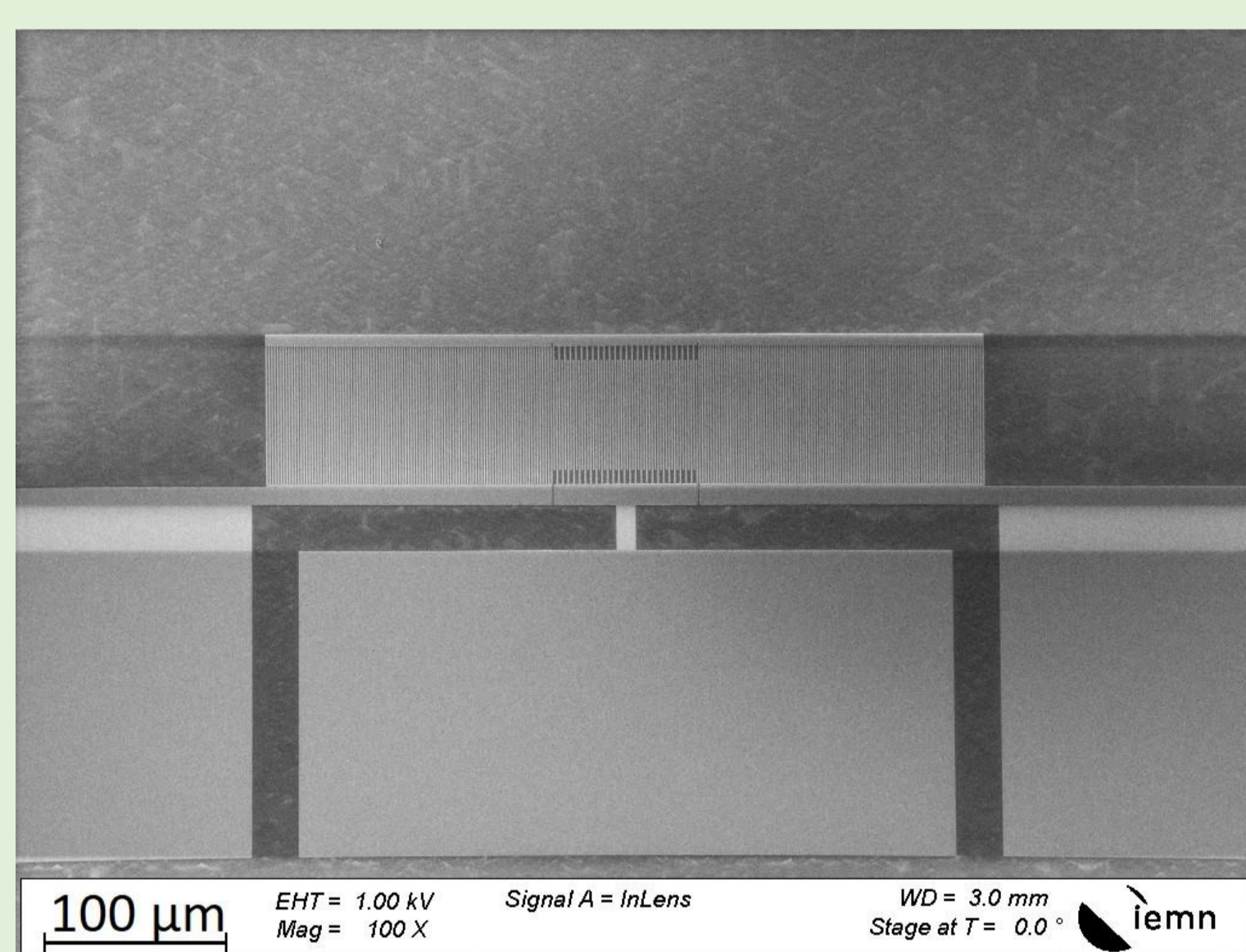
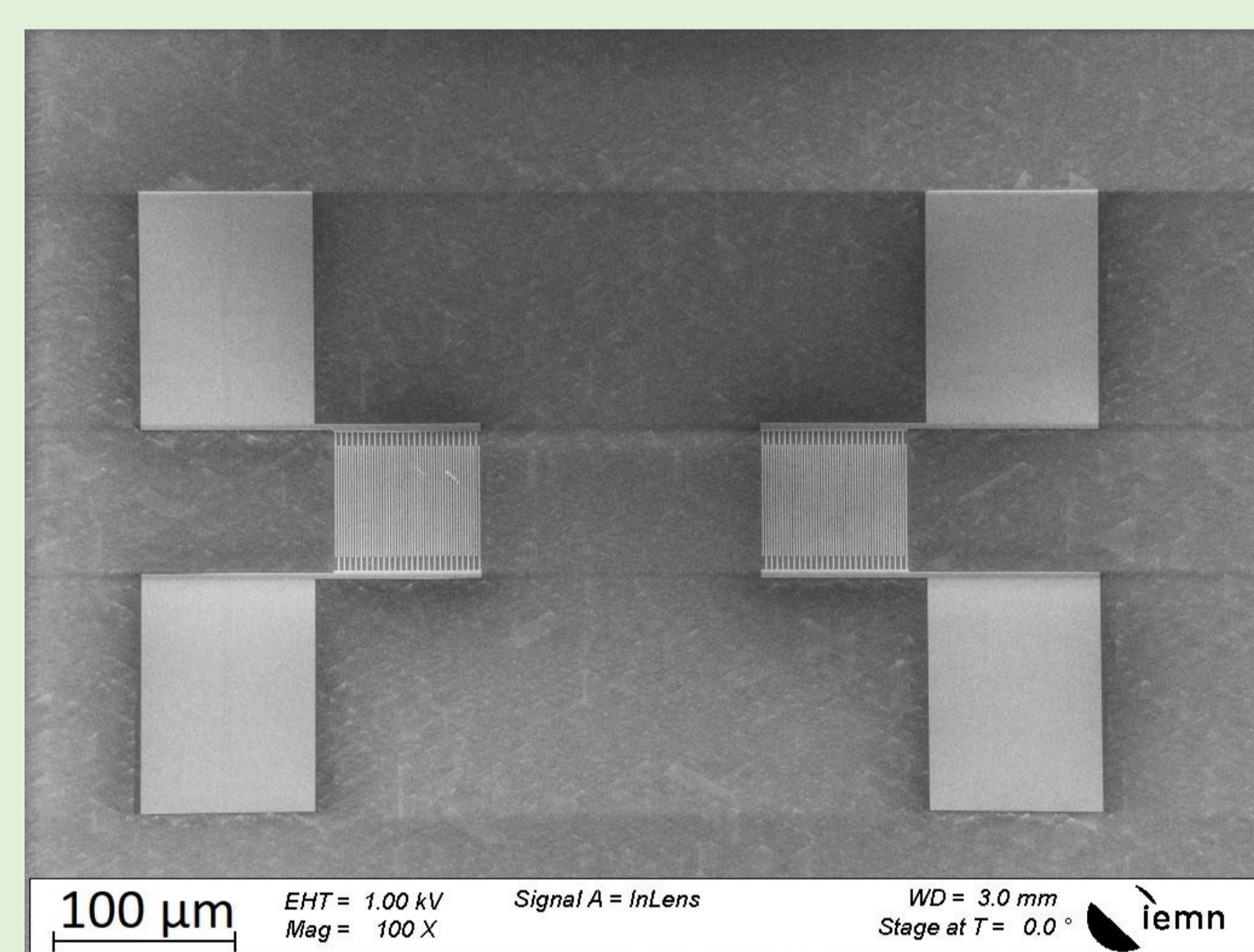
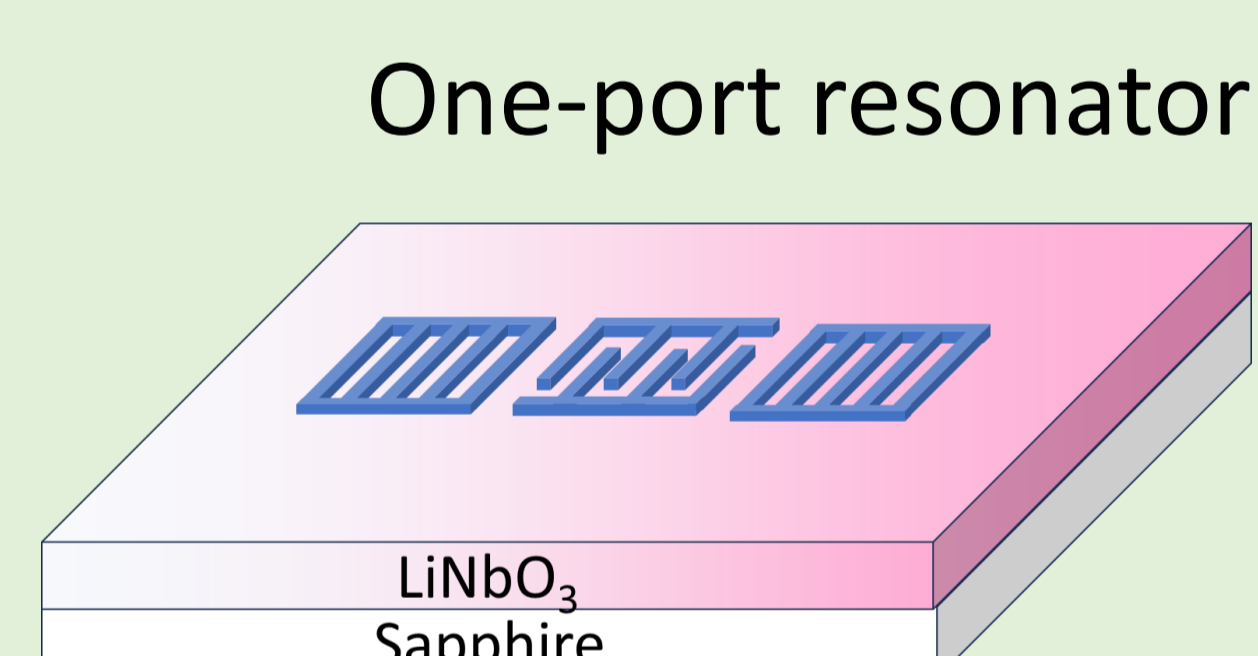
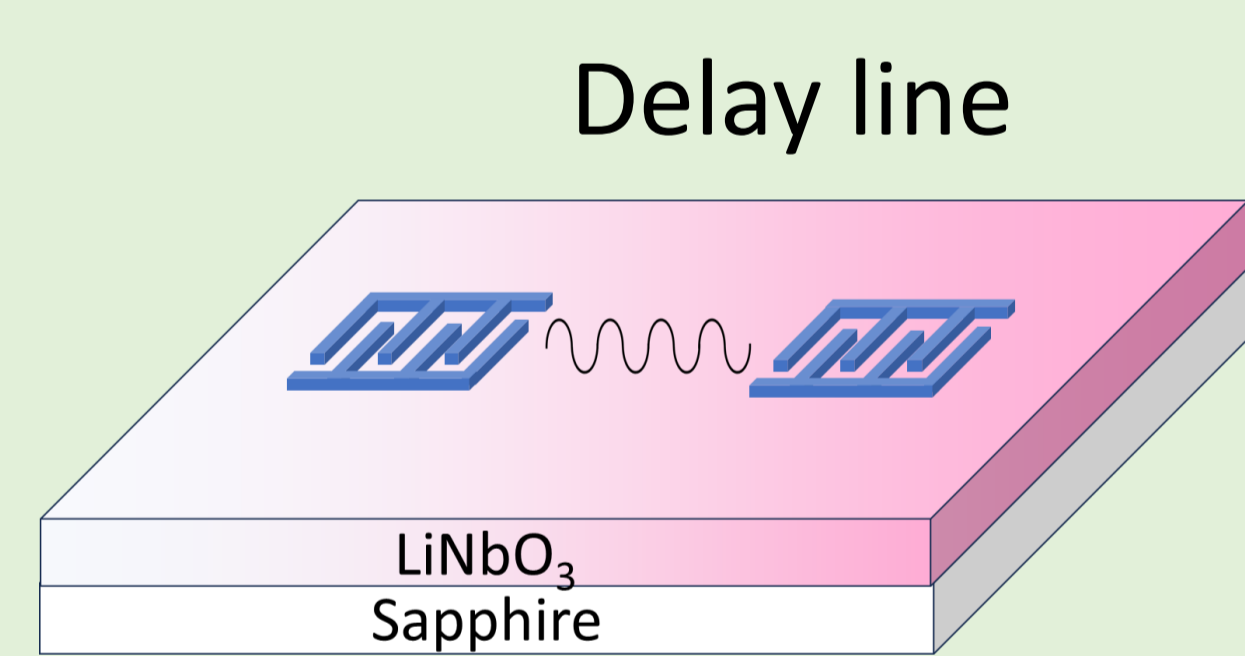


- P < 5x10<sup>-5</sup> mbar
- T<sub>S</sub> = 400°C
- Deposition time: 3 hours
- Al<sub>2</sub>O<sub>3</sub> (0001), 4 inches

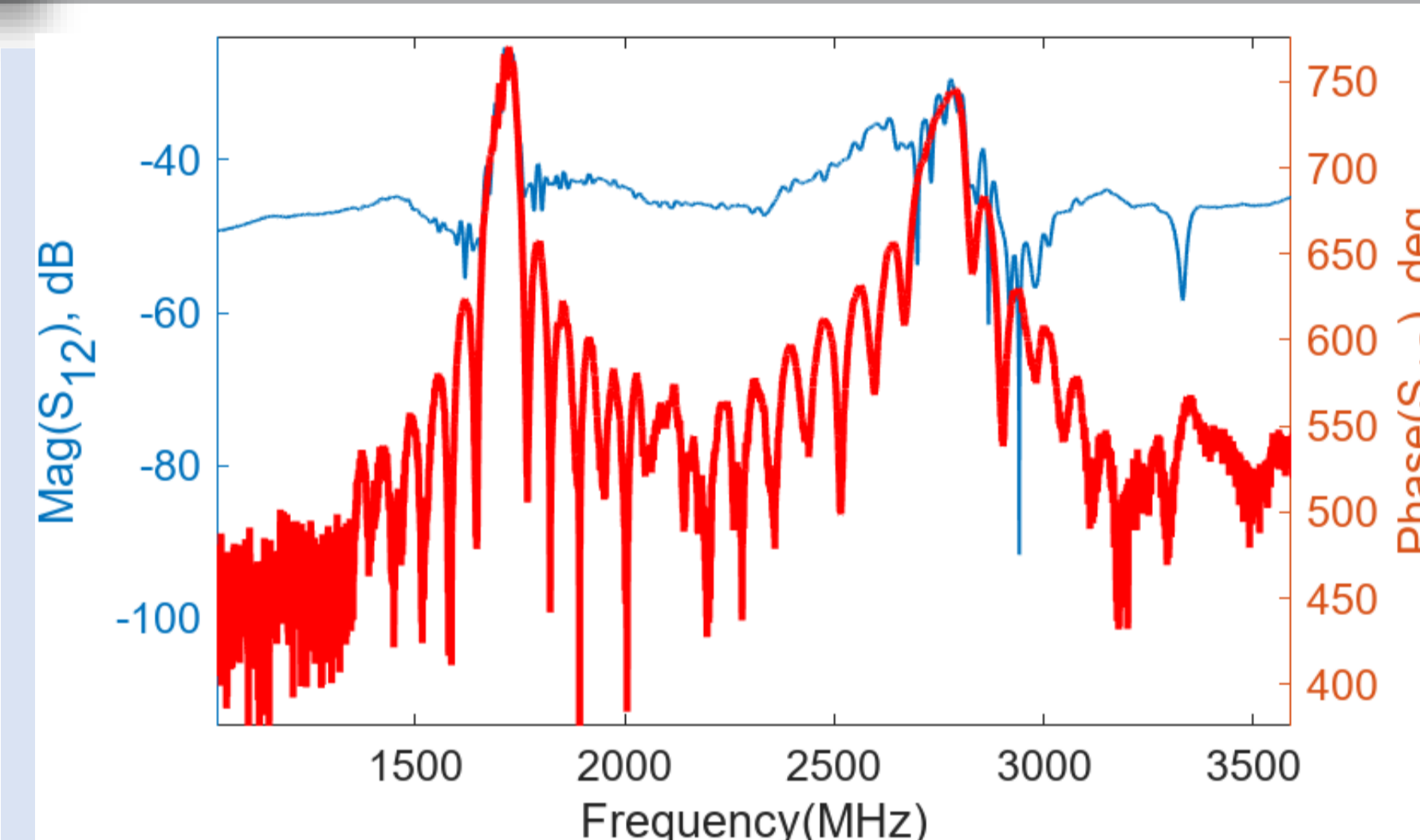
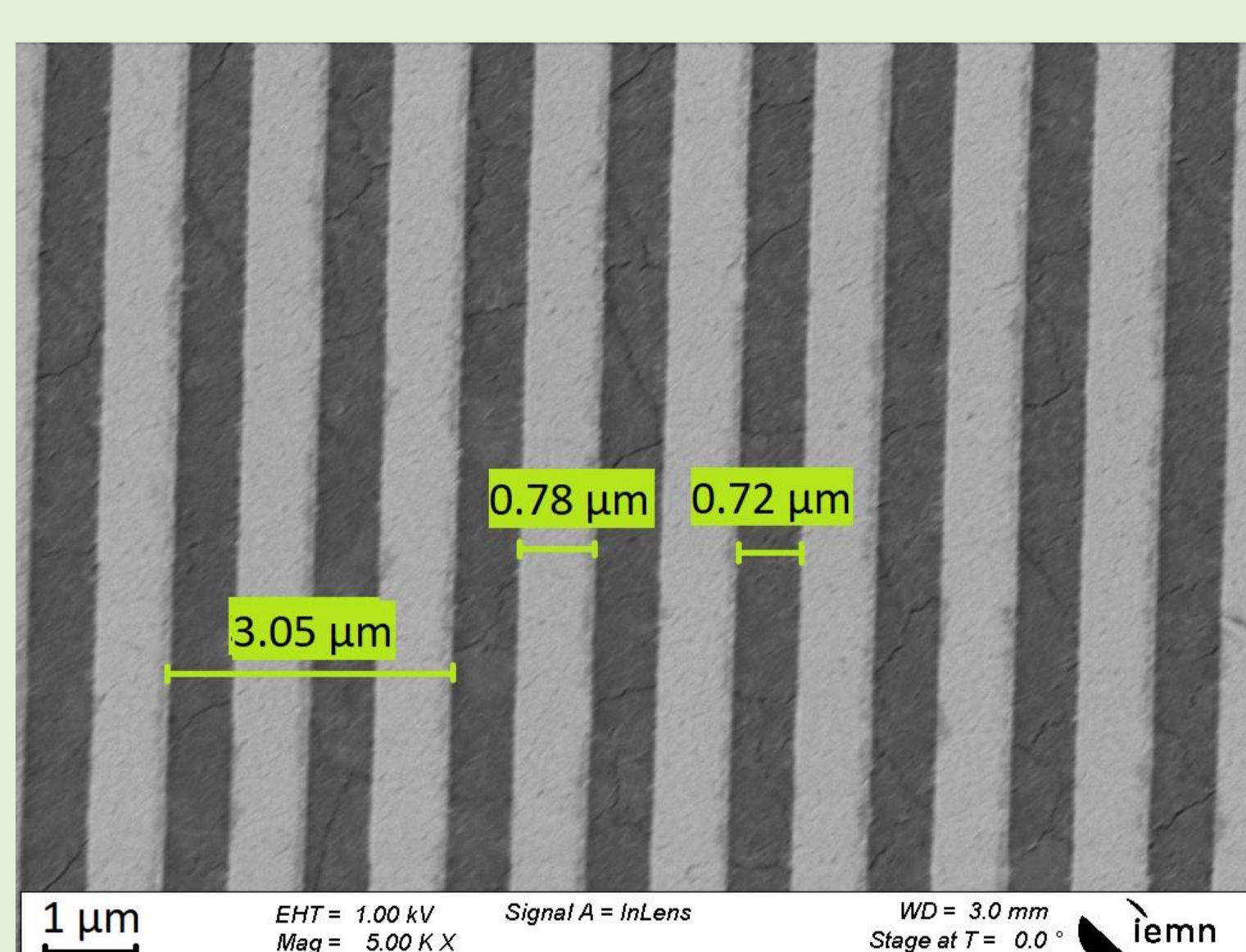


## Device Fabrication

## Acoustic Measurement



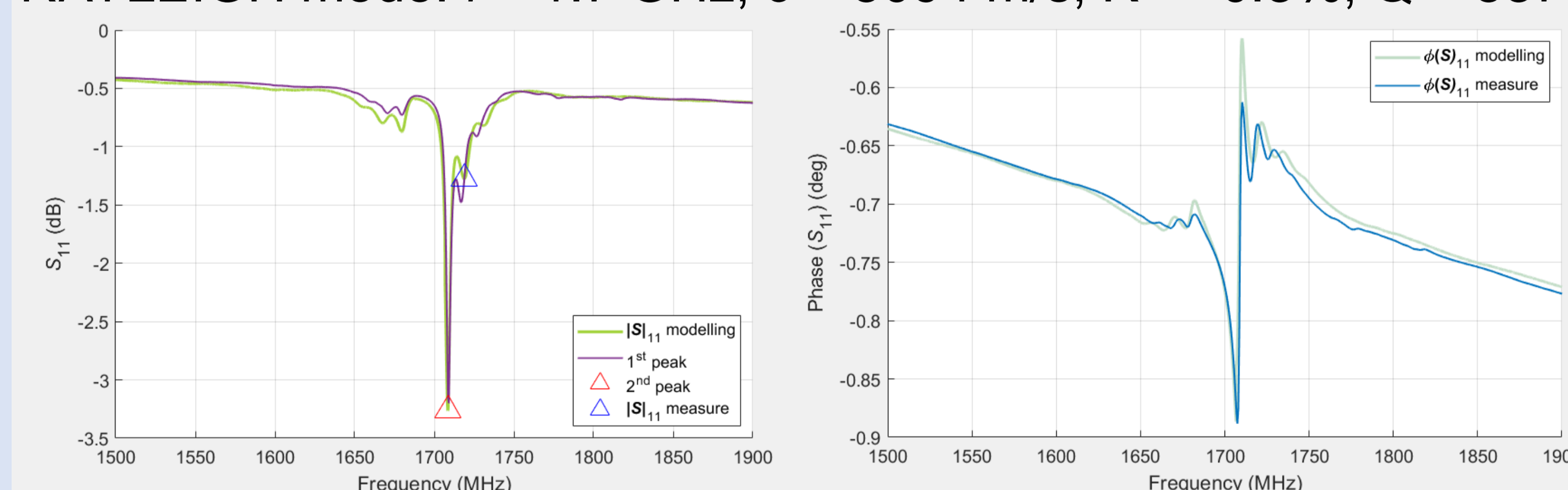
	Delay line	Resonator
t <sub>LN</sub> (nm)	350	350
W (μm)	0.75	0.75
λ (μm)	3	3
L (μm)	67.5	67.5
N <sub>i</sub> (pair)	26	26
N <sub>r</sub>		102
Electrode	Al	Al
t <sub>e</sub> (nm)	50	50



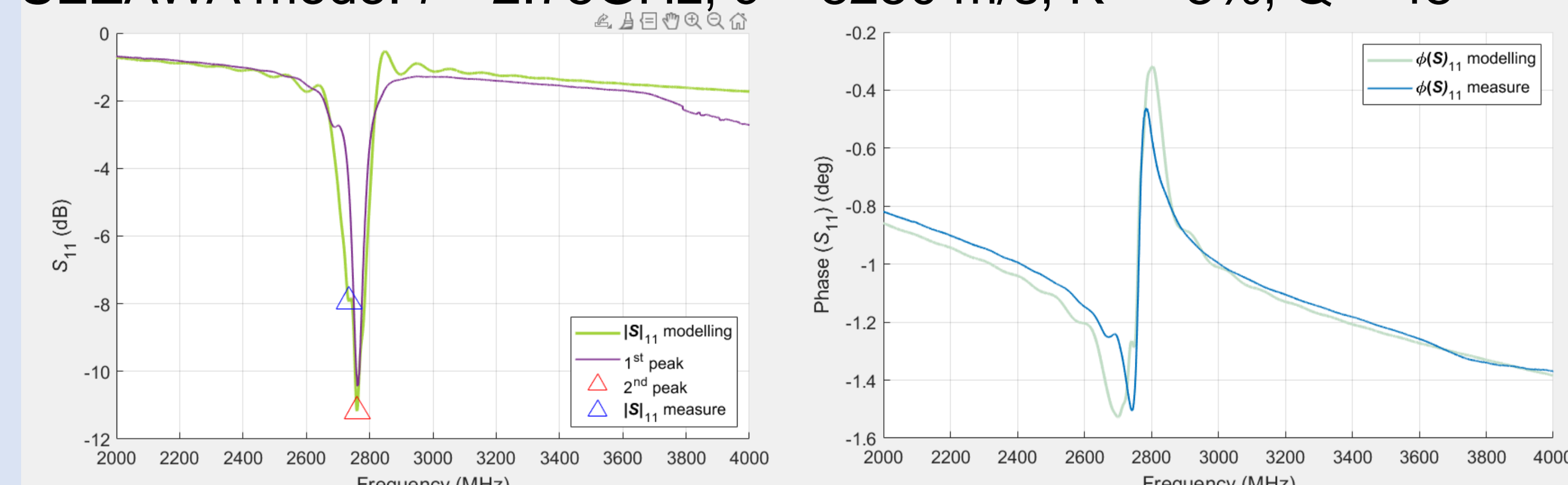
Good quality DLs  
(IL ~ -25 dB)

### Comparison of Experimental and COM simulation

RAYLEIGH mode:  $f = 1.7$  GHz,  $c = 5094$  m/s,  $K^2 = 0.3\%$ ,  $Q = 537$



SEZAWA mode:  $f = 2.75$  GHz,  $c = 8250$  m/s,  $K^2 = 3\%$ ,  $Q = 48$



**Conclusion:** Preliminary results are promising for the RF surface acoustic wave (SAW) applications of LN thin film deposited by CBVD