

# Al<sub>0.6</sub>Sc<sub>0.4</sub>N deposition on Patterned Metal Electrodes

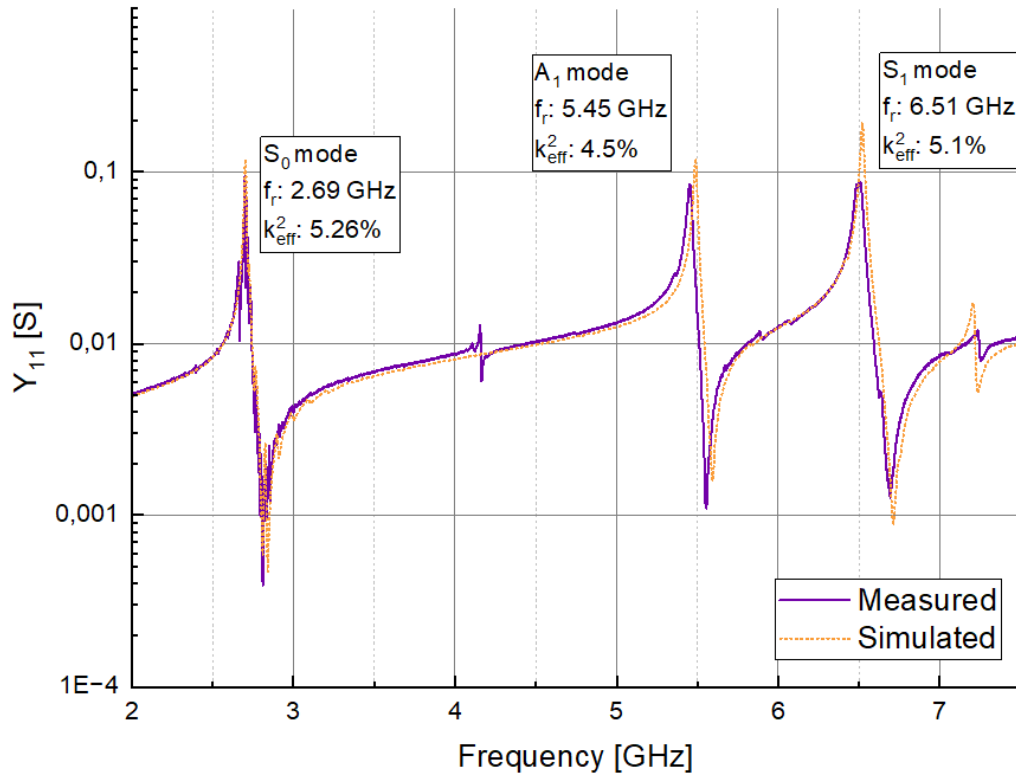
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Doping of Aluminum Nitride with Scandium allows to increase the piezoelectric coefficient and improve the electromechanical coupling, increasing the energy efficiency and allowing for filters with larger bandwidth. Issues arise during deposition of the thin film with the increase of Sc doping, because of the difficulty in nucleating on the Wurtzite crystal phase of AlN. To implement such thin films in resonator fabrication the bottom electrode must be patterned, to reduce the parasitic capacitance which originates from a full metal layer. We present our study on deposition of AlScN with a Sc doping concentration of 40% on patterned substrates and fabrication of piezoelectric resonators from such layers.

To measure the quality of the piezoelectric films we compared the measured resonators with a FEM simulation (Figure 1) of different resonance modes. We compare the extracted parameters to previous DFT calculations and experimental results and show an improvement of coupling 1.5x compared to 32% doping.



**Figure 1** Comparison of simulated and measured resonator responses, to extract the elastic and piezoelectric coefficients from symmetrical and antisymmetrical resonance modes.