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利用形態 : 機器利用、技術代行
利用課題名(日本語) : 表面弾性波共振器によるリザーバーコンピューティング
Program Title (English) : Reservoir computing with Surface Acoustic Wave Resonators.
利用者名(日本語) : クロダメフン
Username (English) : Claude Meffan
所属名(日本語) : 京都大学大学院工学研究科
Affiliation (English) : Graduate School of Engineering , Kyoto University,
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1. 概要(Summary)

The purpose of this research is to realize a reservoir computing system using Surface Acoustic Wave (SAW) resonator. For a resonating physical reservoir computer, a non-linear operation mode, and control the quality factor is required. To achieve this in a SAW device, we fabricated a series of resonating SAW Fabry-Perot cavities with a narrow acoustic aperture, and various acoustic mirror reflectivity. Through this method, we achieved a non-linear SAW device, with designable Q-factor in air.

2. 実験(Experimental)

【利用した主な装置】

レーザー直接描画装置、レジスト現像装置、
ウェハスピン洗浄装置、両面マスクアライナー

【実験方法】

SAW Resonators are fabricated by the patterning of Aluminium electrodes on the surface of Y-cut Z-propagating Lithium Niobate (LiNbO_3). Initially, an aluminium thin film was deposited onto the surface of the LiNbO_3 wafer using electron beam evaporation. UV photolithography was used to pattern electrodes on the surface of the LiNbO_3 wafer. The final electrodes could then be formed through wet-etching. The electro-mechanical response of the SAW resonator device structure was measured using an Impedance Analyser, and Vector Network Analyser.

3. 結果と考察(Results and Discussion)

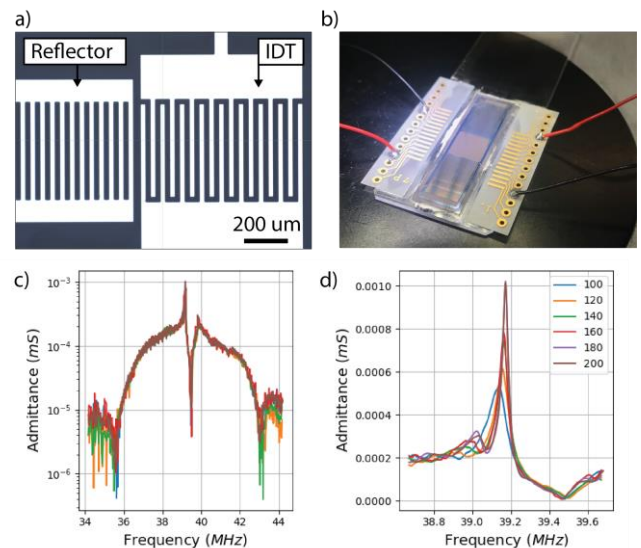


Figure 1 Sample device and impedance spectra.

A sample of a fabricated device can be seen in Figure 1 a) b), alongside a typical impedance spectrum in Figure 1 c) d). The electrical response of the fabricate devices show good agreement with theory. In addition, the Q factor of the non-linear SAW device could be controlled between 250 and 1000 by varying the total periods of the distributed reflectors. This is shown in Figure 1 d). This indicates that the “fading memory” property for reservoir computing can be readily controlled for SAW resonator implementations.

4. その他・特記事項(Others) なし

5. 論文・学会発表(Publication/Presentation)

なし

6. 関連特許(Patent) なし