

＊課題番号 : F-12-KT-0024
 ＊支援課題名 (日本語) : MEMS振動型ジャイロ스코ープの加速度感度の低減
 ＊Program Title (in English) : Acceleration sensitivity of MEMS vibrating gyroscope
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※概要 (Summary) :

Out-of-plane vibrating coupled resonators were fabricated on SOI wafers to verify the frequency decoupling effect on anti-phase vibration amplitude. The measurements of anti-phase vibration amplitude showed that frequency decoupling is important to suppress the acceleration sensitivity in tuning fork gyroscopes.

※実験 (Experimental) :

We used the following machines for fabricating coupled resonator structures using SOI wafers as shown in Fig. 1.

- (1) B19 (dicing for JEIDA to Semi wafer)
- (2) A11 (SPM machine for wafer cleaning)
- (3) A8 (Resist application machine)
- (4) A7, Manual Spin coater (for HMDS)
- (5) A2 (I-line stepper machine)
- (6) A10 (Resist developer machine)
- (7) B08 (RIE machine for Si etching)
- (8) B10 (RIE for photo-resist ashing)
- (9) B12 (Vapor phase HF machine for BOX layer removal)
- (10) B18, B20, B21, B22 (Laser dicing, vacuum moulder, UV irradiation, expander)
- (11) C16 (Polytec MSA-500 for resonant motion observation)

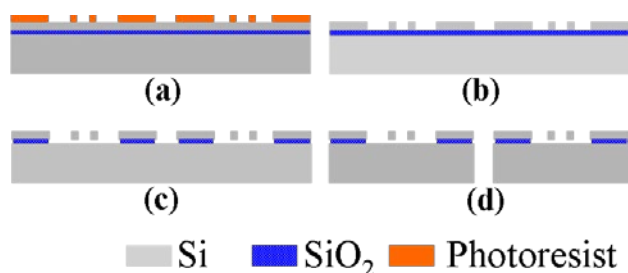


Fig. 1 Fabrication process

※結果と考察 (Results and Discussion)

Fig. 2 shows the cross-section of the SOI wafer after DRIE process. The process condition has been optimized to reduce the notch on the bottom of the single crystal silicon layer. Using vapor HF etching machine, we successfully released the fabricated the coupled resonators as shown in Fig. 3. We used the laser scanning vibrometer (MSA-500), we characterized the frequency response of the fabricated coupled out-of-plane resonator. We verified the frequency decoupling effect on the anti-phase mode vibration, experimentally.

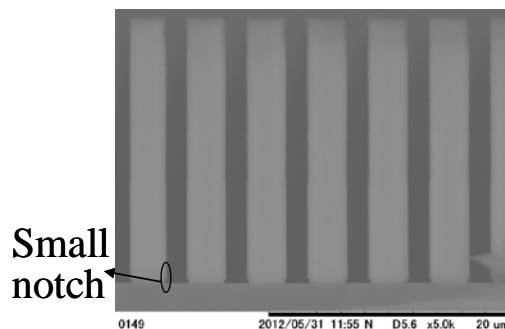


Fig. 2 Cross section of DRIE processed silicon layer.

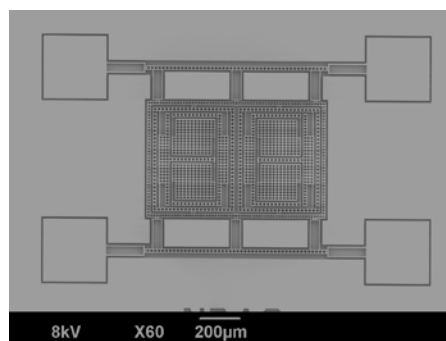


Fig. 3 Fabricated coupled resonator

※その他・特記事項 (Others) :

I-Line Stepper alignment process should be established.