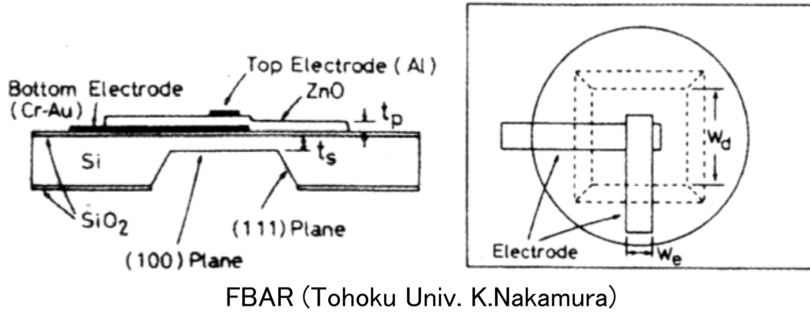
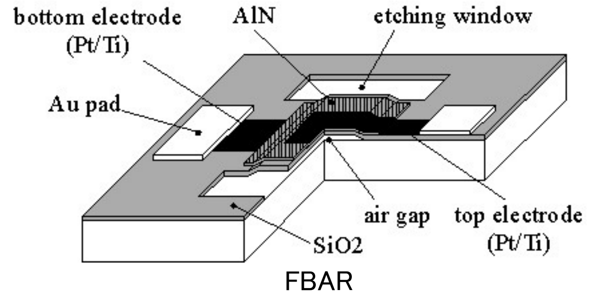
B9

MEMS Resonator

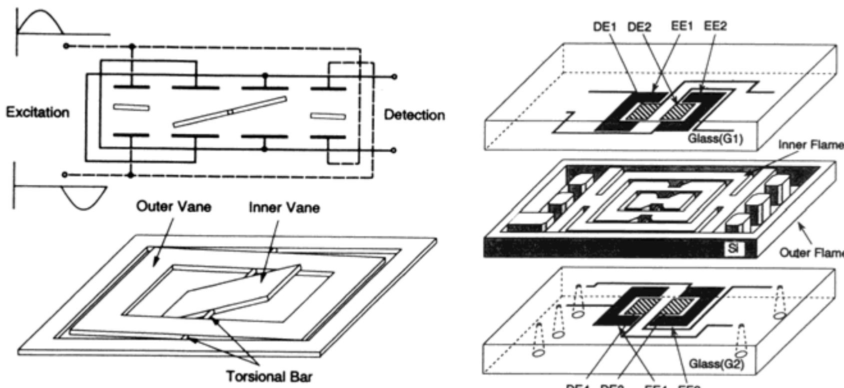


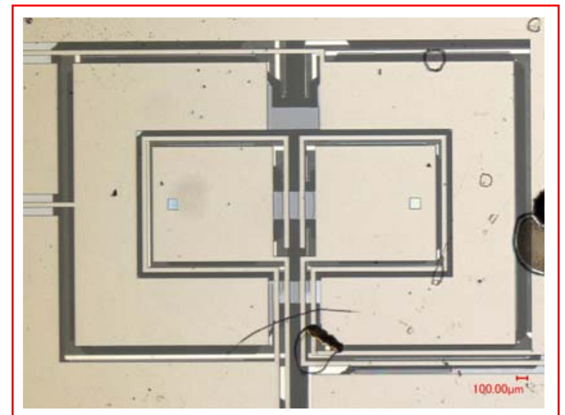
FBAR (Tohoku Univ. K.Nakamura)



FBAR

Reference : K.Nakamura, H.Sasaki and H.Shimizu, A Piezoelectric Composite Resonator Consisting of a ZnO Film on an Anisotropically Etched Silicon Substrate, Proc. of 1st Symp. On Ultrasonic Electronics (1980), Jap. J. of Applied Physics, 20(1981) Supplement 20-3, pp.111-114
M.Hara, J.Kuypers, T.Abe and M.Esashi, Surface Micromachined AlN Thin Film 2GHz Resonator for CMOS Integration, Sensors & Actuators A, 117 (2005) pp.211-216

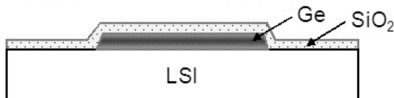




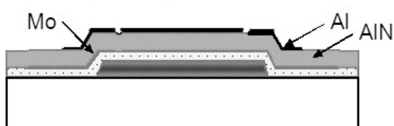
Packaged high Q MEMS resonator (Tohoku Univ. - Shimazu Corp.)

Reference : K.Yoshimi, K.Minami, Y.Wakabayashi and M.Esashi, Packaging of Resonant Sensors, Technical Digest of the 11th Sensor Symposium(1992) pp.35-38

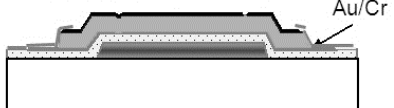
1. Ge パターニングと SiO_2 堆積



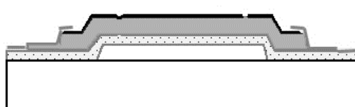
2. 金属パターニングと AlN 堆積

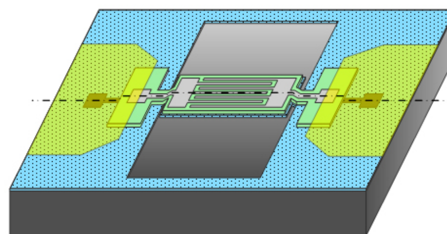


3. AlN と Au/Cr のパターニング

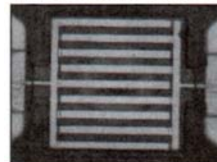


4. Ge 犠牲層エッチング

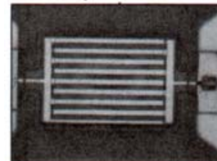




Pitch:12μm, 331MHz



Pitch:8μm, 498MHz



Pitch:4μm, 995MHz

Lamb wave resonator (Tohoku Univ. - Nihon Dempa Kogyo)

Reference : K.Hirano, M.Esashi and S.Tanaka, Aluninum Nitride Lamb Wave Resonator Using Germanium Sacrificial Layer, 2nd International Workshop on Piezo-devices Based on Latest MEMS Technologies (2008) pp.111-117