

Study of air-suspended RF MEMS inductor configurations for realizing large inductance variations

TOKYO TECH
Pursuing Excellence

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Background & Purpose

various wireless services

- mobile phones
- LANs
- televisions
- GPS
- WiMAX
- etc...

Great demand for 1 chip RF LSI system
800M ~ 6GHz

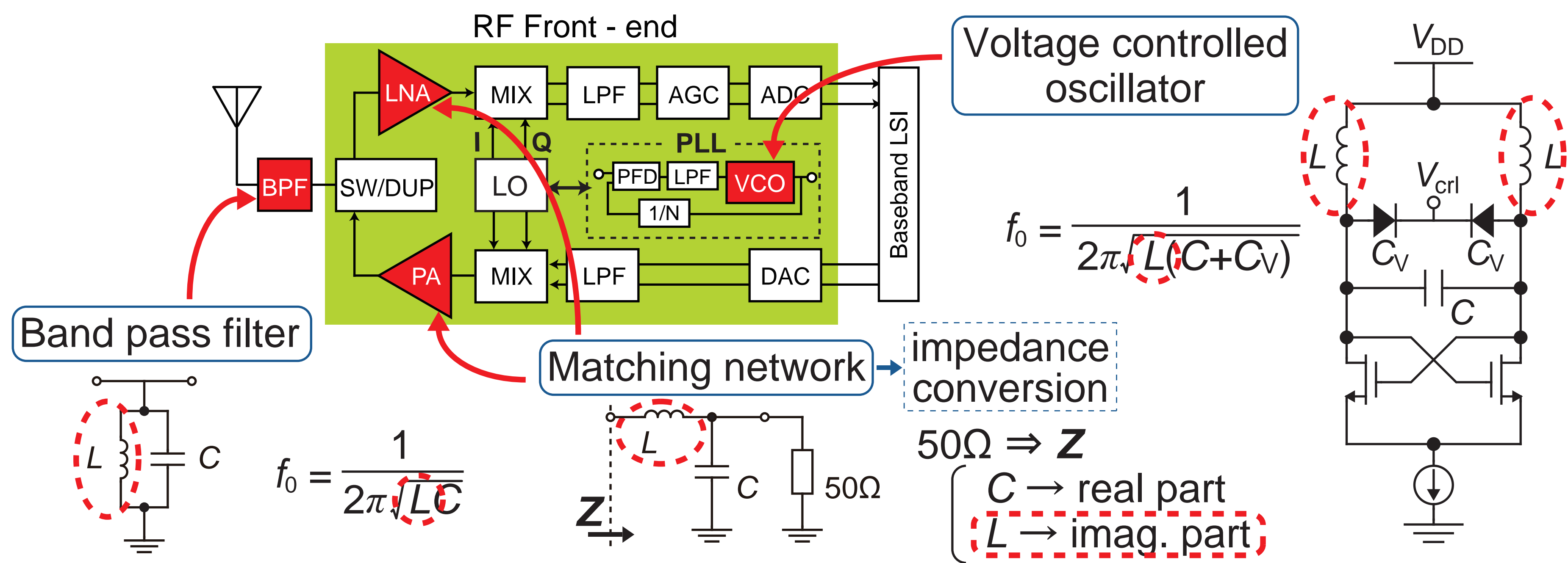
variable inductor

- wide tuning range
- high Q

Purpose

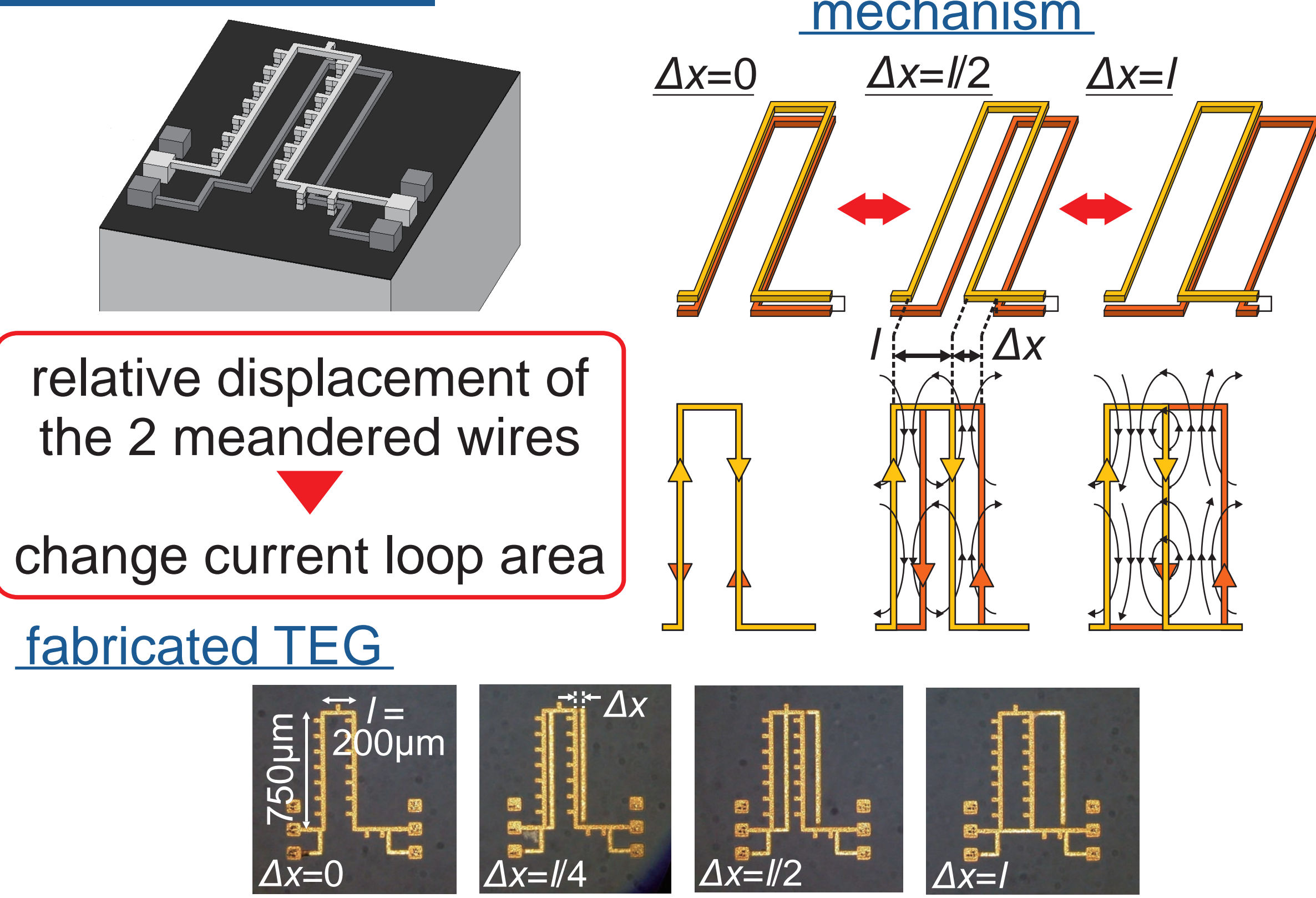
realize

multi- / wide-band RF circuit

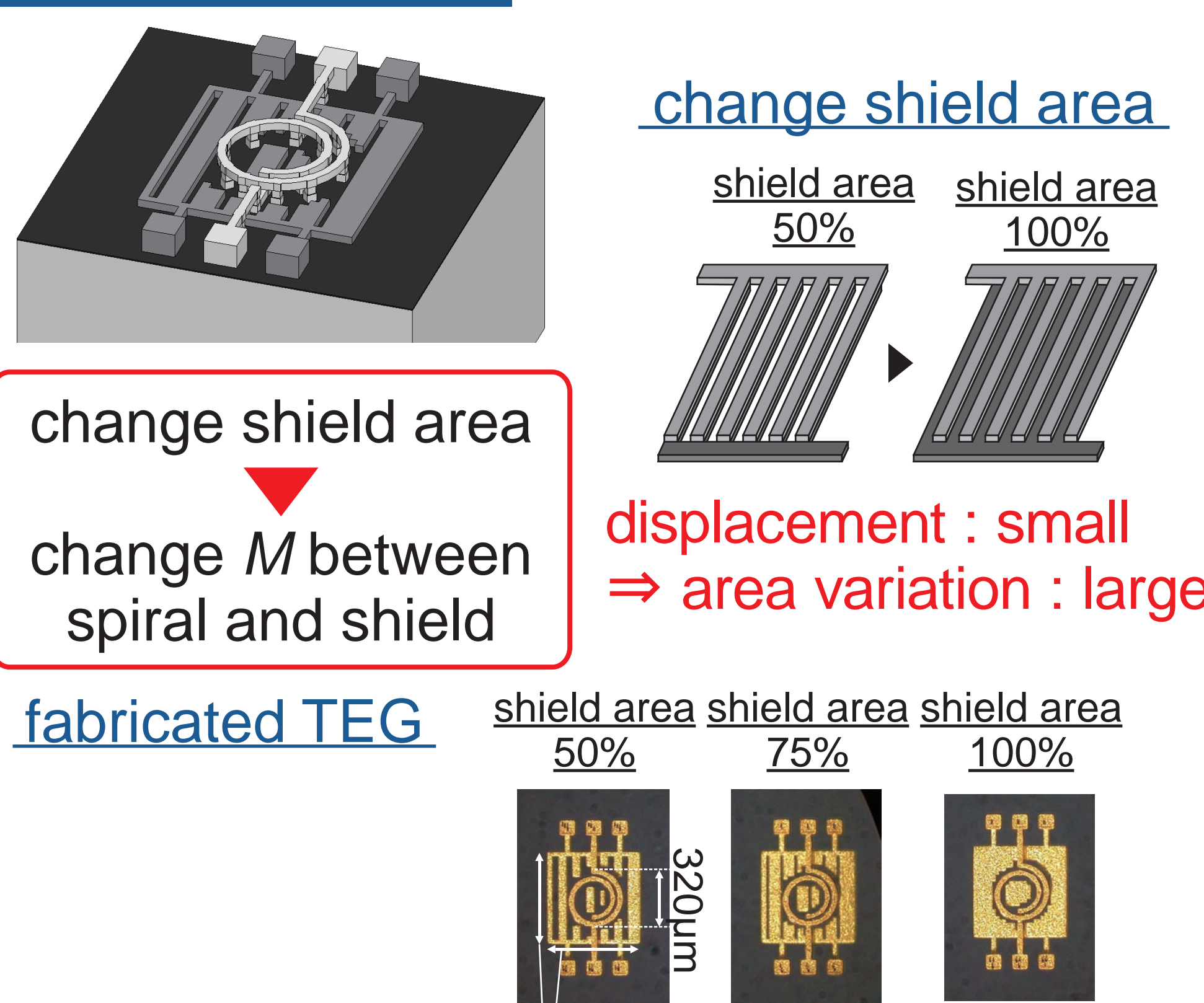


Variable Inductor Configurations

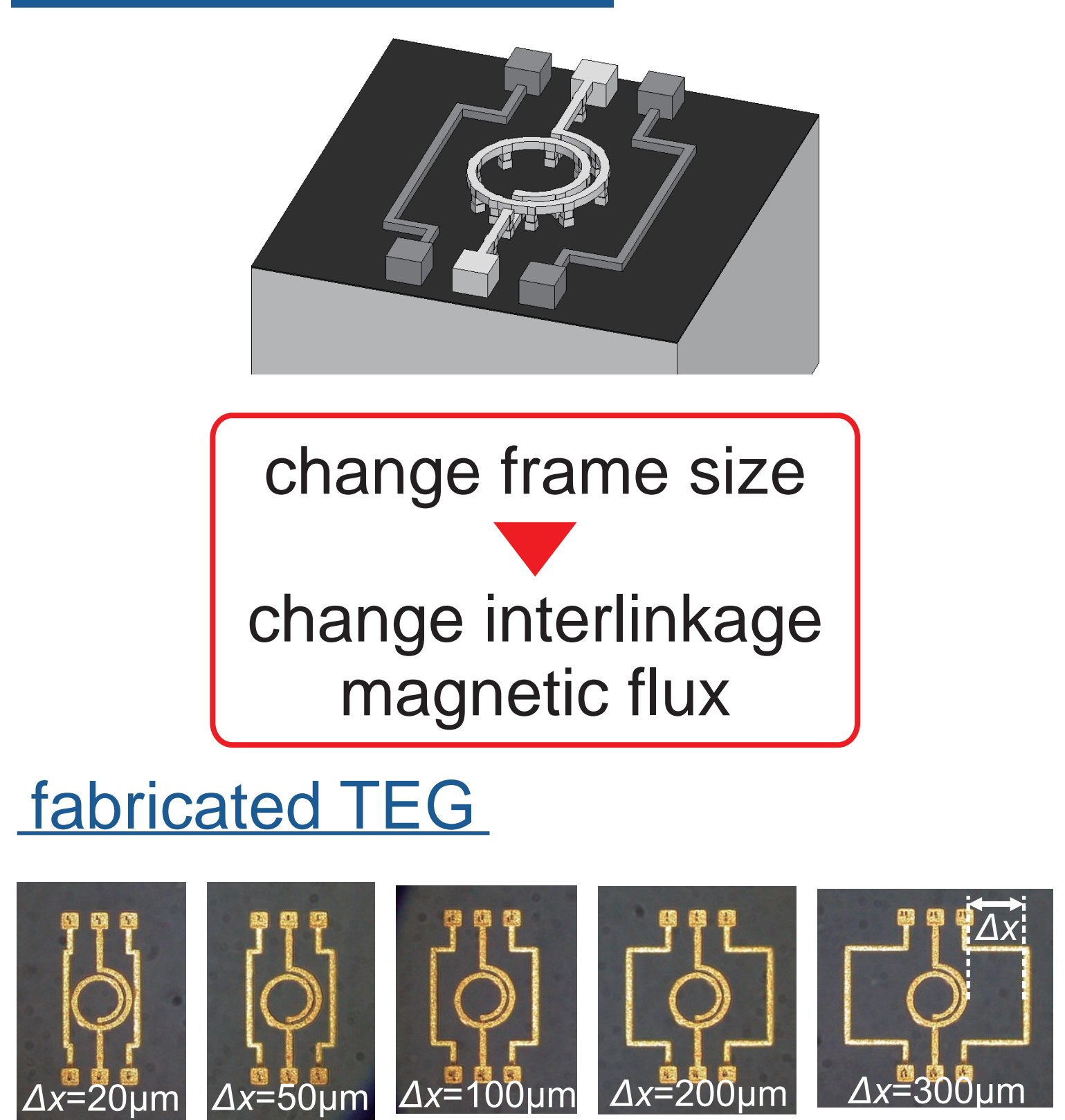
A. Meander-type



B. Spiral + shield

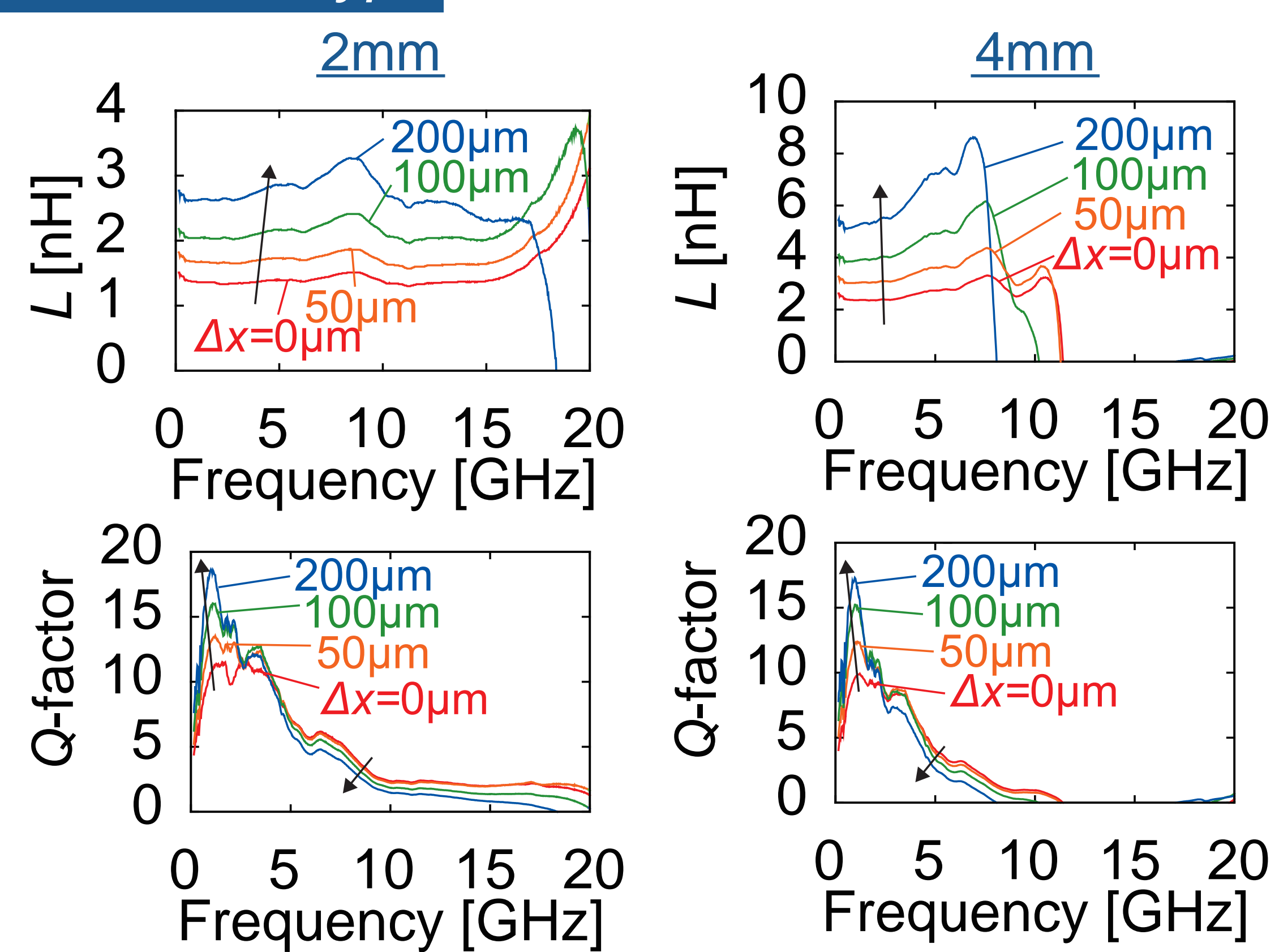


C. Spiral + frame

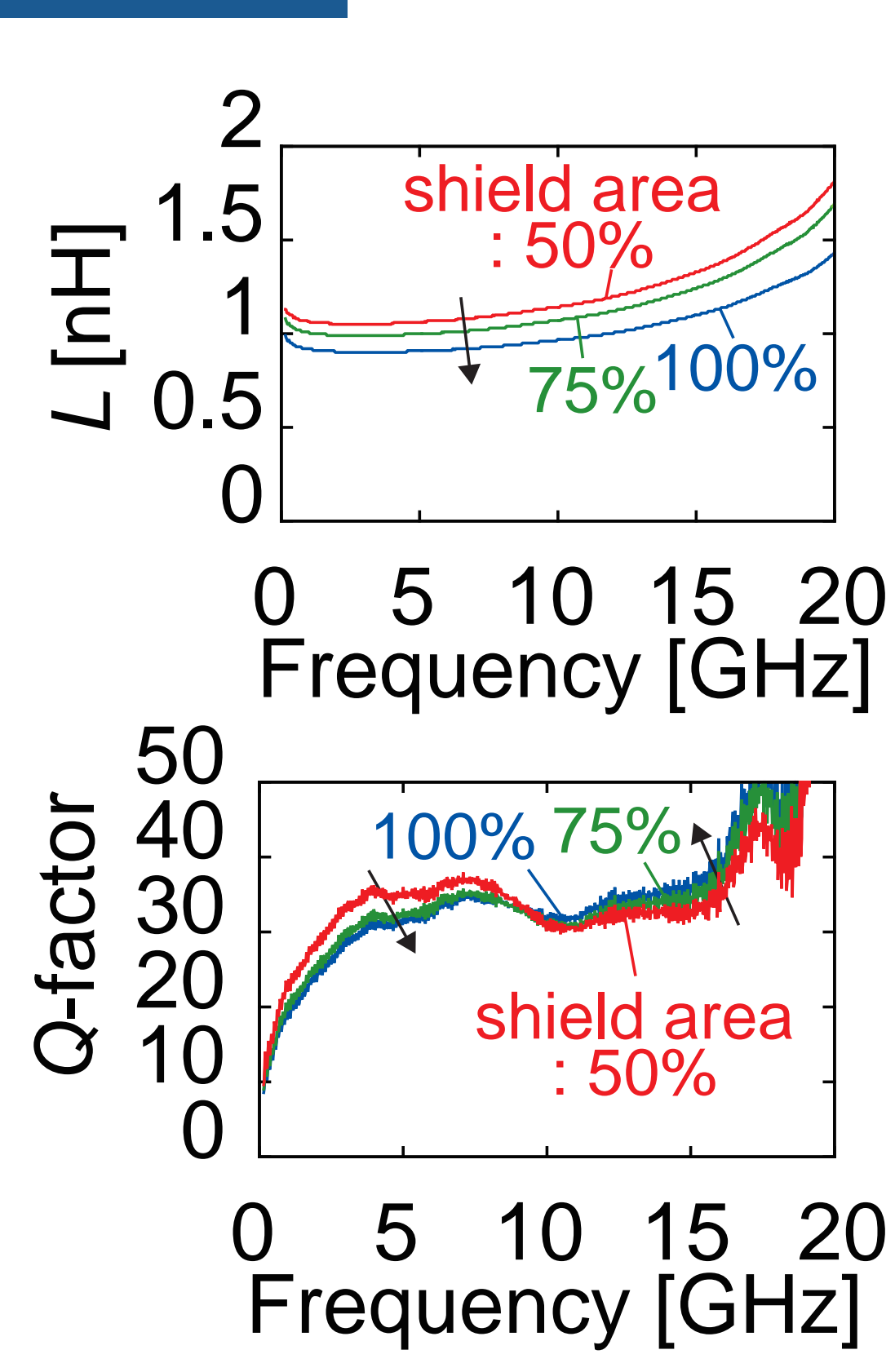


Measurement Results

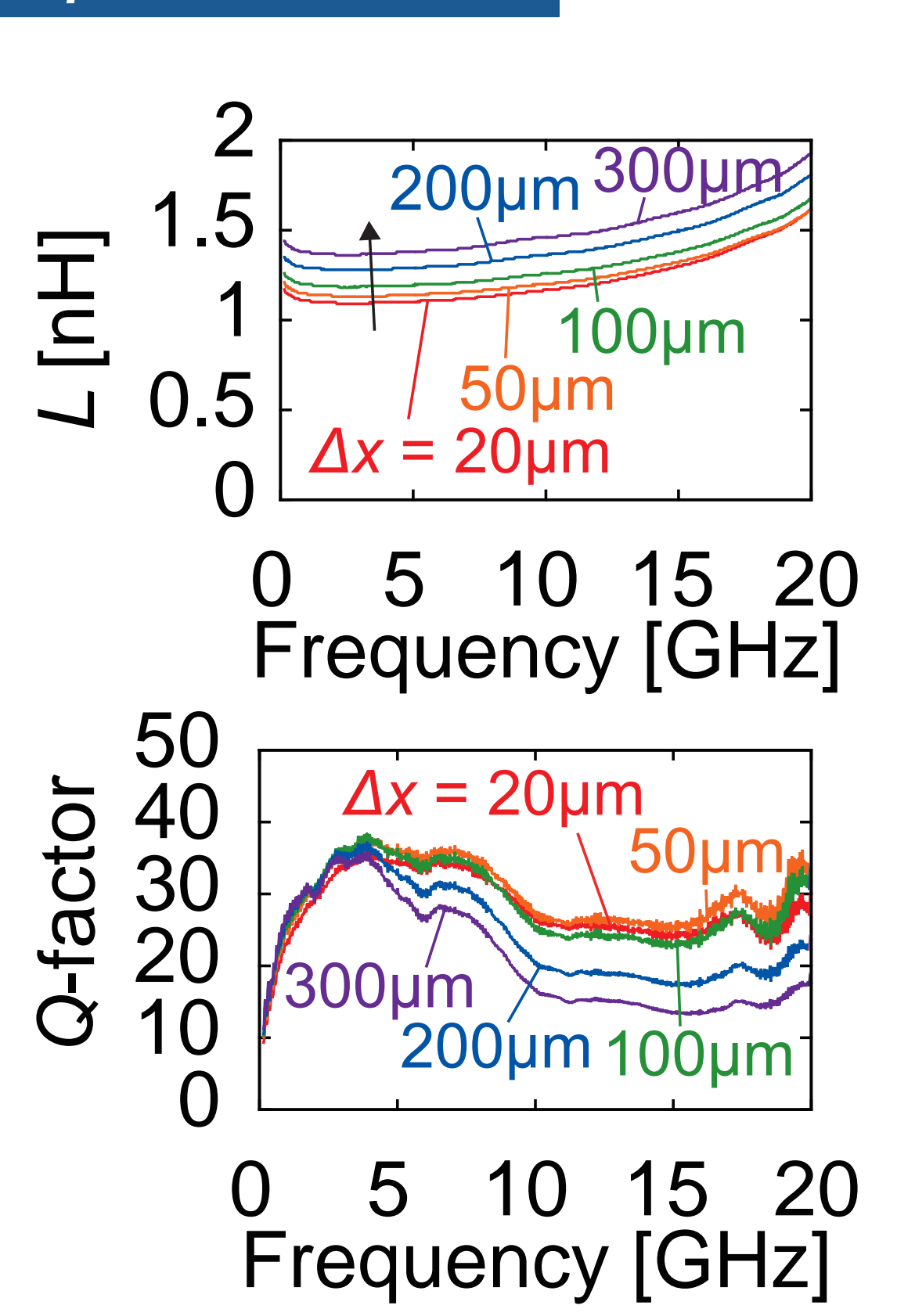
A. Meander-type



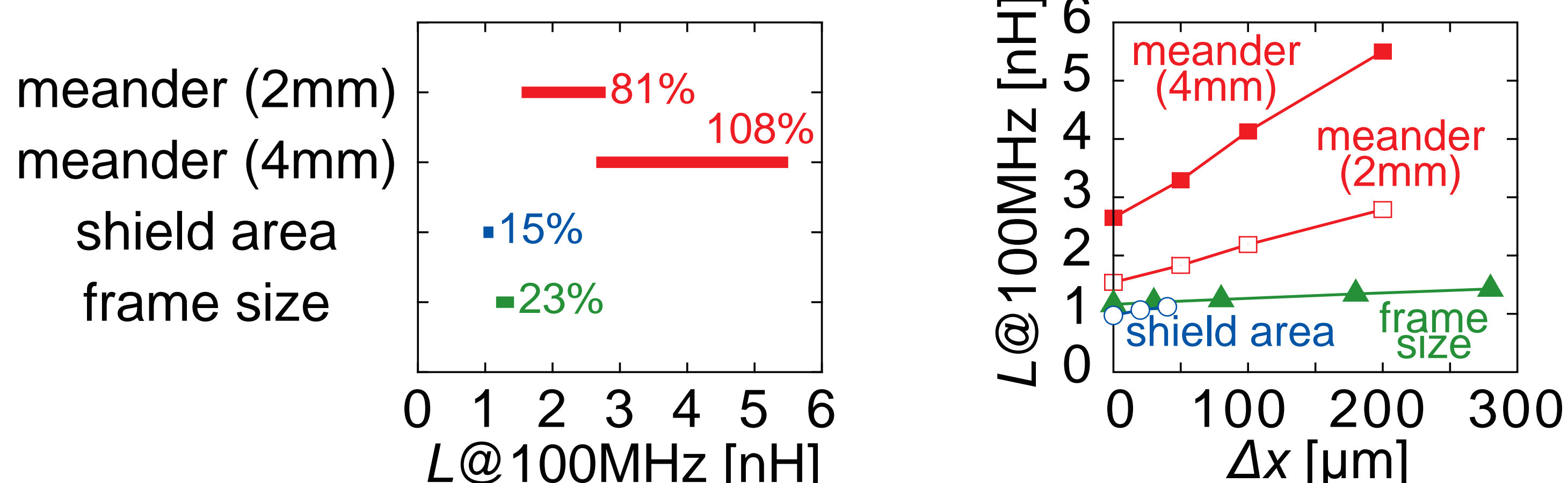
B. Spiral + shield



C. Spiral + frame



Comparison



Summary and Conclusion

- 1) meander-type inductor ⇒ large inductance variations (2.65nH → 5.50nH ; 108%)
- 2) shield area, frame size << meander-type (15%) (23%) (108%)
- 3) air-suspended MEMS inductors >> on-chip inductors (because of wideband high-Q)