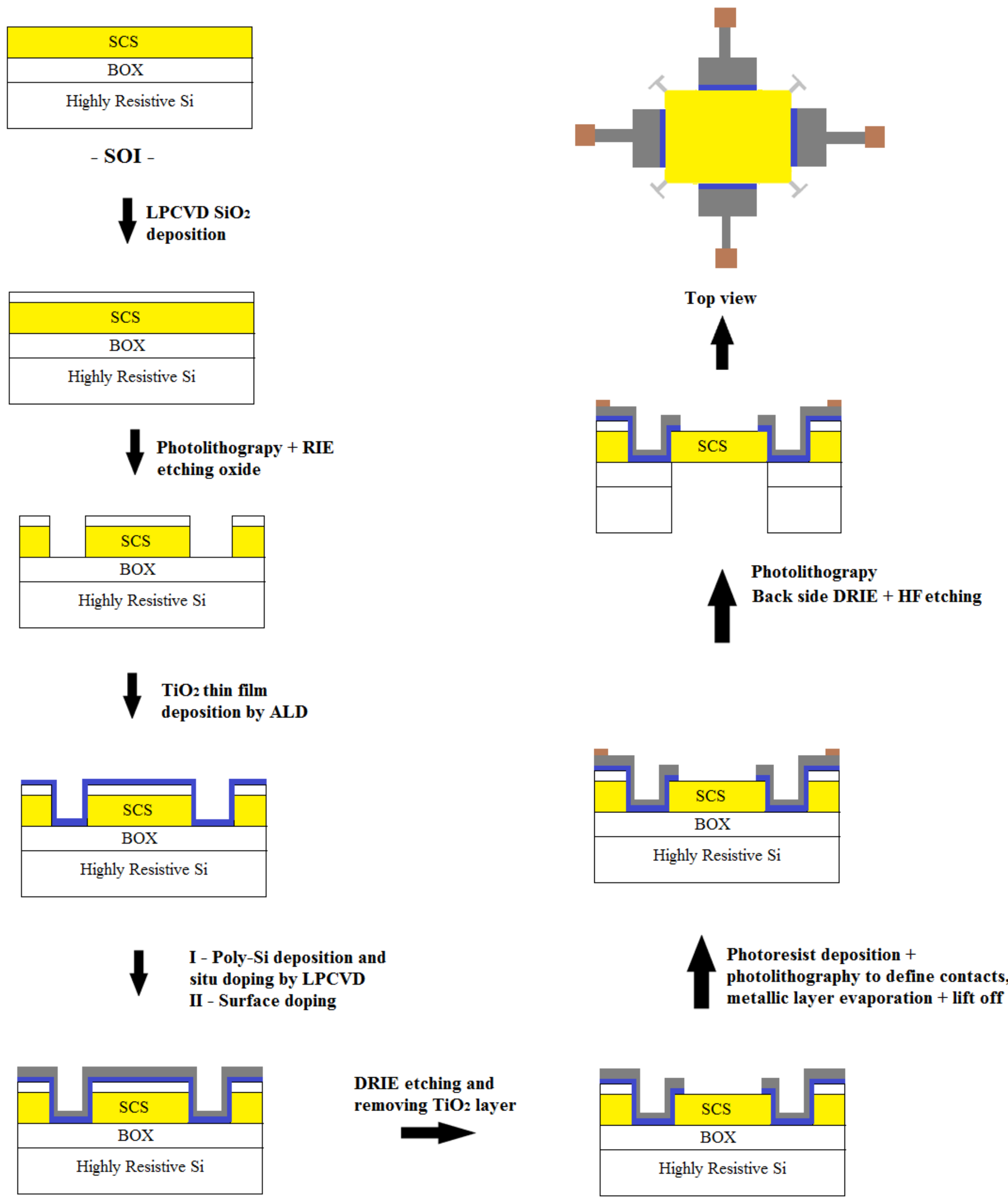
Solid Gap MEMS resonator



PROCESS for Solid Gap resonators

-SOI wafer-

SOI 100: Device layer: 50µm, 0.01 ohm.cm^{-1}
Box: 2µm
Handle layer: 380µm, highly resistive

1) SiO_2 deposition by LPCVD (600nm thick)
2) Photolithography, resonator structure definition (smallest design: 10µm)
3) RIE etching of the SiO_2 resist
4) DRIE etching to transfer the pattern to the SOI device layer
5) 50 to 100 nm thickness of TiO_2 deposition by ALD for solid gap
6) 2µm thick Poly-Si deposition with in situ p type doping (5.10^{18} at.cm^{-3}) by LPCVD.
7) Doping of the surface by implementation in order to realize highly doped Poly-Si contacts. For a doping in surface of 10^{22}at.cm^{-3}$\rightarrow$ dose: 10^{15}at.cm-2, 15keV, and annealing 850°C during 1min?
8) DRIE etching of the poly-Si layer
9) Process for removing the TiO_2 thin film. Following these, surface of the resonator could be functionalized with micro/nano structures (e.g. nanograss).
10) Metallic deposition Cr (15nm)/Pt(100nm)/Au(300nm)
11) Photolithography of contacts and lift-off
12) Front side protection with photoresist
13) Back-side photolithography
14) Back-side DRIE etching of Silicon wafer and HF etching of SiO_2 (BOX) to suspend the resonator.

PROCESS for Air gap resonator

-SOI wafer-

SOI 100: Device layer: 50µm, 0.01 ohm.cm^{-1}
Box: 2µm
Handle layer: 380µm, highly resistive

1) SiO_2 deposition by LPCVD (600nm thick)
2) Photolithography, resonator structure definition (smallest design: 10µm)
3) RIE etching of the SiO_2 resist
4) DRIE etching to transfer the pattern to the SOI device layer
5) 50 to 100 nm SiO_2 deposition by LPCVD for sub-micron air gap
6) 2µm thick Poly-Si deposition with in situ p type doping (5.10^{18} at.cm^{-3}) by LPCVD.
7) Doping of the surface by implementation in order to realize highly doped Poly-Si contacts. For a doping in surface of 10^{22}at.cm^{-3}$\rightarrow$ dose: 10^{15}at.cm-2, 15keV, annealing 850°C during 1min?
8) DRIE etching of the poly-Si layer
9) Process for removing the SiO_2 thin film for realizing the air gap. Following this, surface of the resonator could be functionalized with micro/nano structures (e.g. nanograss).
10) Metallic deposition Cr (15nm)/Pt(100nm)/Au(300nm)
11) Photolithography of contact and and lift-off
12) Front side protection with photoresist
13) Back-side photolithography
14) Back-side DRIE etching of Silicon wafer and HF etching of SiO_2 (BOX) to suspend the resonator.