Chapter 5

Conclusion

5-1 Conclusion

In this thesis, a novel fabrication to integrate SOI and SU-8 is proposed and demonstrated. In this surface-micromachining-like process, the device layer of the SOI substrate and the SU-8 layer are two structural layers, separated by an oxide sacrificial layer. The stress-free and single-crystalline nature of the top SOI layer and the transparency of SU-8 in the visible spectrum range make this process ideal for integration of mechanical structures, optical devices, photo detectors, and circuits.

An integrated device with a 135° mirror, latching mechanism, stressed lifting arm, and photodiodes are demonstrated. SU-8/SCS bimorph stress beams have been successfully used in this integrated device to lift up the micromirror and avoid sticking to substrate. The residual stress of SU-8 dose not shows significant relaxation over a period of more than one month. The IV curves of the photodiodes are measured and the calculated sensitivity is about 1.8 A/W at 650 nm wavelength.

5-2 Future work

There are three major problems as mentioned in Chapter 3. They are adhesion of SU-8, SU-8 anchor and latch design. In the future, to design the new latch mechanism is the first thing to do. Therefore, the contact area or the anchor and the number of hinges should be increased to improve the yield. Additionally, it is important to design

the proper contact area of SU-8 to avoid the micromirror peel off. New design of anchors is also important to avoid the hinge bar getting stuck. For example, SU-8 can be anchored close to the hinge bar to avoid gaps.

In the seven-mask process, it is important to dip in BOE before depositing Au. To design other mechanisms to lift up the micromirror is important, too. After popping up the micromirror, the design of accurate positioning is another important issue to do. Finally, the most important assignment is to fabricate integrated micro lenses or other micro optical components in SU-8 using this novel SOI/SU-8 integration process.