Chapter 5

Conclusion and Suggestion for Future Work

5.1 Conclusions

In thesis, we successfully fabricate the amorphous thin film transistor on the plastic substrate. By using several kinds of the hard coating, we solve the adhesion issue between the device and the substrate. Moreover, the hydrogen dilution gas can improve the material properties of the films deposited at low temperature. We finally have the mobility about 0.08 cm^2/V.s and 0.0007 cm^2/V.s for silicon and plastic substrate, respectively.

By using the surface treatment on the oxide layer, we also can the adhesion issue between P3HT solvent and the oxide surface. The use of the self-assembly materials (hexamethyldisilazane, octadecyltrichlorosilane, and chlorotrimethylsilane) for chemically modifying the surface of silicon dioxide gate insulator prior to the deposition of the organic semiconductor is effective to enhance the field effect mobility to 1E-2 cm^2/V.s.

5.2 Suggestion for future work

Although we had already successfully fabricated the thin film transistor on the plastic substrate, the electric performance was not good enough. We need to optimize the electrical properties of a-Si TFT fabricated on plastic substrate at 100oC. If we can optimize the electrical properties, then we can study on the characterization on the amorphous thin film transistor suffered from various bending situations. Furthermore, we also can study on the laser crystallization of the amorphous silicon film on the plastic substrate.

The most important factor to determine the speed of carrier mobility in organic transistors is the molecular ordering of the organic semiconductor. We can try to study on the influence of surface alignment layers on the performance of the transistor. Moreover, we also can investigate the solvent type and concentration for P3HT. How to pattern the P3HT film is the most important thing that we must to find out and study on.