CHAPTER V
CONCLUSIONS

EG spirosilicate monomer was synthesized by using 250 mmol of SiO_2, 125 mmol of TETA, 4% (of SiO_2) of NaOH and excess amount of EG at 200°C under N_2 atmosphere. Although this monomer was found to have thermal stability, the breaking surface of EG spirosilicate was exhibited after crosslinking by UV exposure.

PG spirosilicate monomer was also successfully synthesized by using the same condition as the synthesis of EG spirosilicate monomer except changing the reaction temperature to the boiling point of pentamethylene glycol (about 240°C). After crosslinking by using UV radiation, the crosslinked PG spirosilicate presented a better property by comparing with crosslinked EG spirosilicate, such as, better surface formation, lower moisture absorption and higher resolution of photoresist pattern. However crosslinked PG spirosilicate had not present acceptable resolution pattern, and chemical stability. It meant that not only crosslinked EG spirosilicate but also crosslinked PG spirosilicate cannot be used as suitable polymeric photoresist materials to establish side wall deposition in DNA detector.

Problems from both EG and PG spirosilicates leaded to a new derivative of polymeric photoresist. 2-Chloroethylmethyldichlorosilane was used successfully to form the hydrophobic side wall deposition on surface of SiO_2 wafer. Without using spincoater, the best condition was found to be 4 hour exposure time that produced much higher thickness than 1 μm . For using spincoater, 200 rpm with 4 hour UV exposure time gave the greatest resolution pattern and the better resolution, as compared with non-using spincoater process. Suitable etching solvent, boiled 70% H_2SO_4 in water solution, showed the easiest pattern formation in developing process.

Amazingly, 2-chloroethylmethyldichlorosilane gave both negative and positive photoresist patterns depending on the type of photomask. The higher thermal conductivity of photomask, the higher heat transfer from the mask to the polymer, resulting in a positive photoresist.