## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Representation of director orientation in the succession of layers along the stack and pitch length.</td>
<td>8</td>
</tr>
<tr>
<td>1.2</td>
<td>Typical repeating units in a side chain LCP.</td>
<td>15</td>
</tr>
<tr>
<td>1.3</td>
<td>Schematic synthetic route for the formation of cholesteryl ester, polymycholesteryl ester and polymycholesteryl ester co-1-hexene.</td>
<td>18</td>
</tr>
<tr>
<td>1.4</td>
<td>Schematic synthetic route for the formation of cholesteryl ester, polymycholesteryl ester sulfone and polymycholesteryl ester sulfone co-1-hexene.</td>
<td>20</td>
</tr>
<tr>
<td>2.1</td>
<td>Schematic representations of different types of co-polymer structures.</td>
<td>32</td>
</tr>
<tr>
<td>2.2</td>
<td>Schematic representations of different types of block co-polymer.</td>
<td>32</td>
</tr>
<tr>
<td>2.3</td>
<td>Plot for computing $r_1$ and $r_2$ according to the Finemann-Ross method.</td>
<td>37</td>
</tr>
<tr>
<td>3.1</td>
<td>SO$_2$ production setup for sulfonation.</td>
<td>50</td>
</tr>
<tr>
<td>3.2</td>
<td>GPC chromatogram.</td>
<td>55</td>
</tr>
<tr>
<td>3.3</td>
<td>A typical molecular weight distribution curves.</td>
<td>55</td>
</tr>
<tr>
<td>3.4</td>
<td>A typical DSC thermogram showing several transitions.</td>
<td>57</td>
</tr>
<tr>
<td>3.5</td>
<td>A typical TGA thermogram.</td>
<td>58</td>
</tr>
<tr>
<td>4.1</td>
<td>Schematic synthetic reaction paths of polymers.</td>
<td>66</td>
</tr>
<tr>
<td>4.2</td>
<td>Finemann- Ross plot for computing reactivity ratios of CHA ($r_1$) and 1-hexene ($r_2$).</td>
<td>69</td>
</tr>
<tr>
<td>4.3</td>
<td>Finemann- Ross plot for computing reactivity ratios of CHMA ($r_1$) and 1-hexene ($r_2$).</td>
<td>70</td>
</tr>
<tr>
<td>4.4</td>
<td>Finemann- Ross plot for computing reactivity ratios of CHPE ($r_1$) and 1-hexene ($r_2$).</td>
<td>71</td>
</tr>
<tr>
<td>4.5</td>
<td>Schematic synthetic reaction paths of co-polymers.</td>
<td>72</td>
</tr>
<tr>
<td>4.6</td>
<td>FT-IR spectra of CHA, PCHA and PCHAH12.</td>
<td>74</td>
</tr>
<tr>
<td>4.7</td>
<td>FT-IR spectra of CHMA, PCHMA and PCHMAH11.</td>
<td>75</td>
</tr>
</tbody>
</table>
4.8 FTIR spectra of CHPE, PCHPE and PCHPEH21. 76
4.9 Molecular structure of cholesteryl ester. 78
4.10 $^1$H-NMR spectra of (a) CHA, (b) PCHA and (c) PCHAH12. 78
4.11 $^1$H-NMR spectra of (a) CHMA, (b) PCHMA and (c) PCHMAH12. 80
4.12 $^1$H-NMR spectra of (a) CHPE, (b) PCHPE and (c) PCHPEH21. 81
4.13 Molecular weight distribution of (a) PCHA and (b) PCHAH11. 83
4.14 Molecular weight distribution of (a) PCHMA and (b) PCHMAH12. 84
4.15 Molecular weight distribution of (a) PCHPE and (b) PCHPEH21. 86
4.16 POM image of PCHA at (a) 115.4°C and (b) 137.6°C. 91
4.17 POM image of PCHAH11 at (a) 90.6°C and (b) 113.8°C. 91
4.18 POM image of PCHMA at (a) 181.3°C and (b) 262.7°C. 92
4.19 POM image of PCHMAH12 at (a) 179.2°C and (b) 310.7°C. 92
4.20 POM image of PCHPE at (a) 83.0°C and (b) 120.9°C. 93
4.21 POM image of PCHPEH21 at (a) 97.3°C and (b) 116.4°C. 93
4.22 DSC thermograms of polycholesterylacrylate and polycholesterylacrylate co-1-hexenes. 96
4.23 DSC thermograms of polycholesteryl methacrylate and polycholesteryl methacrylate co-1-hexenes. 96
4.24 DSC thermograms of polycholesteryl 4-pentenoate and polycholesteryl 4-pentenoate co-1-hexenes. 97
4.25 TGA thermograms of polycholesteryl acrylate and polycholesteryl acrylate co-1-hexenes. 98
4.26 TGA thermograms of polycholesteryl methacrylate and polycholesteryl methacrylate co-1-hexenes. 99
4.27 TGA thermograms of polycholesteryl 4-pentenoate and polycholesteryl 4-pentenoate co-1-hexenes.

4.28 X-ray diffraction curves of polycholesteryl acrylate and polycholesteryl acrylate co-1-hexenes.

4.29 X-ray diffraction curves of polycholesteryl methacrylate and polycholesteryl methacrylate co-1-hexenes.

4.30 X-ray diffraction curves of polycholesteryl 4-pentenoate and polycholesteryl 4-pentenoate co-1-hexenes.

4.31 Schematic synthetic reaction paths of polysulfones.

4.32 Schematic synthetic reaction paths of co-polysulfones.

4.33 FT-IR spectra of CHA, PCHAS and PCHASH11.

4.34 FT-IR spectra of CHMA, PCHMAS and PCHMASH11.

4.35 FT-IR spectra of CHPE, PCHPES and PCHPESH21.

4.36 $^1$H NMR spectra of (a) CHA, (b) PCHAS and (c) PCHASH21.

4.37 $^1$H NMR spectra of (a) CHMA, (b) PCHMAS and (c) PCHMASH11.

4.38 $^1$H NMR spectra of (a) CHPE, (b) PCHPES and (c) PCHPESH12.

4.39 SEM (EDX) spectra of PCHAS.

4.40 SEM (EDX) spectra of PCHASH11.

4.41 SEM (EDX) spectra of PCHMAS.

4.42 SEM (EDX) spectra of PCHMASH11.

4.43 SEM (EDX) spectra of PCHPES.

4.44 SEM (EDX) spectra of PCHPESH11.

4.45 Molecular weights distribution of (a) PCHAS and (b) PCHASH11.

4.46 Molecular weights distribution of (a) PCHMAS and (b) PCHMASH12.

4.47 Molecular weights distribution of (a) PCHPES and (b) PCHPESH11.
4.48 POM image of PCHAS at (a) 118 °C and (b) 140.5°C.
4.49 POM image of PCHASH11 at (a) 78.7 °C and (b) 114.8°C.
4.50 POM image of PCHMAS at (a) 81.7 °C and (b) 144.3°C.
4.51 POM image of PCHMASH11 at (a) 149.1 °C and (b) 175.3°C.
4.52 POM image of PCHPES at (a) 116.6 °C and (b) 140.1°C.
4.53 POM image of PCHPESH11 at (a) 152.6 °C and (b) 172.4°C.
4.54 DSC thermograms of polycholesteryl acrylate sulfone and polycholesteryl acrylate sulfone co-1-hexenes.
4.55 DSC thermograms of polycholesteryl methacrylate sulfone and polycholesteryl methacrylate sulfone co-1-hexenes.
4.56 DSC thermograms of polycholesteryl 4-pentenoate sulfone and polycholesteryl 4-pentenoate sulfone co-1-hexenes.
4.57 TGA thermograms of polycholesteryl acrylate sulfone and polycholesteryl acrylate sulfone co-1-hexenes.
4.58 TGA thermograms of polycholesteryl methacrylate sulfone and polycholesteryl methacrylate sulfone co-1-hexenes.
4.59 TGA thermograms of polycholesteryl 4-pentenoate sulfone and polycholesteryl 4-pentenoate sulfone co-1-hexenes.
4.60 X-ray diffraction curves of polycholesteryl acrylate sulfone and polycholesteryl acrylate sulfone co-1-hexenes.
4.61 X-ray diffraction curves of polycholesteryl methacrylate sulfone and polycholesteryl methacrylate sulfone co-1-hexenes.
4.62 X-ray diffraction curves of polycholesteryl 4-pentenoate sulfone and polycholesteryl 4-pentenoate sulfone co-1-hexenes.
4.63 I-V characteristics of PCHAS at different temperatures.
4.64 I-V characteristics of PCHASH11 at different temperatures. 143
4.65 I-V characteristics of PCHMAS at different temperatures. 144
4.66 I-V characteristics of PCHMASH11 at different temperatures. 144
4.67 I-V characteristics of PCHPES at different temperatures. 145
4.68 I-V characteristics of PCHPESH11 at different temperatures. 145
4.69 Plot of 1000/T (K) versus Log (σT) of cholesteryl acrylate, polycholesteryl acrylate sulfones and polycholesteryl acrylate sulfone co-1-hexenes. 152
4.70 Plot of 1000/T (K) versus Log (σT) of cholesteryl methacrylate, polycholesteryl methacrylate sulfones and polycholesteryl methacrylate sulfone co-1-hexenes. 152
4.71 Plot of 1000/T (K) versus Log (σT) of cholesteryl 4-pentenoate, polycholesteryl 4-pentenoate sulfones and polycholesteryl 4-pentenoate sulfone co-1-hexenes. 153
4.72 FT-IR spectra of PCHMAS and UV- ray treated PCHMAS. 154
4.73 FT-IR spectra of PCHMASH11 and UV- ray treated PCHMASH11. 154
4.74 Change in resistance with time when PCHMAS and PCHMASH11 exposed to long wave UV-ray. 156
4.75 Thermistor devices of PCHMAS and PCHMASH11. 157
4.76 Constructional features of the thermistor device. 158