Supporting Information

Raft–like Mixtures of Sphingomyelin and Cholesterol Investigated by Solid-State ^{2}H NMR Spectroscopy

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Table 1. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for PSM-d_{31}, at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="10">$\Delta\nu_Q$/kHz^a</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>15</td><td>20</td><td>25</td><td>30</td><td>36</td><td>38</td><td>40</td><td>45</td><td>50</td><td>55</td></tr>
<tr><td>A</td><td>3</td><td></td><td rowspan="10">117.0</td><td rowspan="10">116.8</td><td rowspan="10">114.3</td><td rowspan="10">105.5</td><td rowspan="10">90.9</td><td rowspan="4">68.0</td><td>72.3</td><td>70.6</td><td>69.3</td><td>67.3</td></tr>
<tr><td>B</td><td>3</td><td></td><td rowspan="2">65.7</td><td>67.1</td><td>65.2</td><td>63.9</td></tr>
<tr><td>C</td><td>2,4-6</td><td></td><td>63.2</td><td rowspan="2">55.8</td><td>57.9</td></tr>
<tr><td>D</td><td>7-9</td><td></td><td>63.7</td><td>59.3</td><td>53.2</td></tr>
<tr><td>E</td><td>10</td><td></td><td rowspan="3">55.1</td><td>56.8</td><td rowspan="2">52.8</td><td>51.2</td><td>47.2</td></tr>
<tr><td>F</td><td>11</td><td></td><td>54.4</td><td>48.8</td><td>45.2</td></tr>
<tr><td>G</td><td>12</td><td></td><td>51.6</td><td>46.3</td><td>42.8</td><td>39.5</td></tr>
<tr><td>H</td><td>2</td><td></td><td rowspan="2">43.8</td><td>48.0</td><td>42.2</td><td>39.4</td><td rowspan="2">36.5</td></tr>
<tr><td>I</td><td>13</td><td></td><td>38.9</td><td>37.7</td><td>37.3</td></tr>
<tr><td>J</td><td>14</td><td></td><td rowspan="2">36.6</td><td rowspan="2">31.3</td><td>34.3</td><td>31.4</td><td>28.7</td></tr>
<tr><td>K</td><td>15</td><td></td><td rowspan="2">32.8</td><td rowspan="2">31.8</td><td rowspan="2">27.6</td><td rowspan="2">25.6</td><td>35.0</td><td>27.5</td><td>25.0</td><td>22.9</td></tr>
<tr><td>L</td><td>16</td><td></td><td>13.6</td><td>7.4</td><td>6.2</td><td>5.3</td><td>4.8</td><td>4.4</td></tr>
</table>

^{a} Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 2. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for PSM-d_{31} in binary mixture with cholesterol $X_C = 0.15$ at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="8">$\Delta\nu_Q$/kHz^a</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td><td>50</td><td>55</td></tr>
<tr><td>A</td><td>2-5</td><td></td><td rowspan="5">102.3</td><td rowspan="5">95.3</td><td rowspan="5">93.2</td><td rowspan="2">83.9</td><td rowspan="2">81.0</td><td>79.8</td><td>77.2</td><td rowspan="2">72.9</td></tr>
<tr><td>B</td><td>6-9</td><td></td><td>76.5</td><td>74.8</td></tr>
<tr><td>C</td><td>10,11</td><td></td><td rowspan="3">64.2</td><td>62.2</td><td>59.9</td><td>58.4</td><td>56.7</td></tr>
<tr><td>D</td><td>12,13</td><td></td><td rowspan="2">51.9</td><td rowspan="2">45.3</td><td>51.5</td><td>47.6</td></tr>
<tr><td>E</td><td>14,15</td><td></td><td>40.8</td><td>38.0</td></tr>
<tr><td>F</td><td>16</td><td></td><td>21.9</td><td>21.0</td><td>19.3</td><td>14.7</td><td>11.6</td><td>9.3</td><td>8.2</td><td>7.4</td></tr>
</table>

^{a} Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 3. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for PSM-d_{31} in binary mixture with cholesterol $X_C = 0.2$ at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="8">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td><td>50</td><td>60</td></tr>
<tr><td>A</td><td>2-9</td><td></td><td>114.5</td><td>110.1</td><td>107.7</td><td>99.7</td><td rowspan="2">84.8</td><td rowspan="2">79.6</td><td rowspan="2">76.9</td><td rowspan="2">70.6</td></tr>
<tr><td>B</td><td>10-13</td><td></td><td>97.7</td><td>96.1</td><td>93.3</td><td>89.2</td></tr>
<tr><td>C</td><td>14</td><td></td><td rowspan="2">81.3</td><td rowspan="2">78.1</td><td rowspan="2">74.9</td><td rowspan="2">67.5</td><td rowspan="2">61.2</td><td rowspan="2">58.7</td><td>56.6</td><td>53.1</td></tr>
<tr><td>D</td><td>15</td><td></td><td>40.5</td><td>42.2</td></tr>
<tr><td>E</td><td>16</td><td></td><td>18.4</td><td>17.4</td><td>15.7</td><td>13.5</td><td>11.0</td><td>8.3</td><td>6.8</td><td>4.9</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 4. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for PSM-d_{31} in binary mixture with cholesterol $X_C = 0.25$ at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="8">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td><td>50</td><td>60</td></tr>
<tr><td>A</td><td>2-7</td><td></td><td>114.3</td><td>113.1</td><td>110.1</td><td>106.7</td><td>101.2</td><td>93.4</td><td>89.0</td><td rowspan="2">84.0</td></tr>
<tr><td>B</td><td>8-12</td><td></td><td>99.3</td><td>97.8</td><td>95.7</td><td>93.3</td><td>91.0</td><td>85.1</td><td>81.8</td></tr>
<tr><td>C</td><td>13,14</td><td></td><td rowspan="2">79.9</td><td rowspan="2">77.5</td><td rowspan="2">75.2</td><td rowspan="2">70.2</td><td rowspan="2">66.2</td><td rowspan="2">63.1</td><td>61.8</td><td>59.4</td></tr>
<tr><td>D</td><td>15</td><td></td><td>51.3</td><td>45.3</td></tr>
<tr><td>E</td><td>16</td><td></td><td>20.2</td><td>19.2</td><td>17.8</td><td>16.2</td><td>14.1</td><td>12.2</td><td>10.7</td><td>9.2</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 5. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for PSM-d_{31} in binary mixture with cholesterol $X_C = 0.33$ at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="9">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>20</td><td>25</td><td>30</td><td>35</td><td>38</td><td>40</td><td>45</td><td>50</td><td>60</td></tr>
<tr><td>A</td><td>2-6</td><td></td><td>113.2</td><td>111.7</td><td>109.7</td><td>107.4</td><td>105.7</td><td>104.8</td><td>99.7</td><td>97.4</td><td>91.0</td></tr>
<tr><td>B</td><td>7-10</td><td></td><td rowspan="2">100.4</td><td rowspan="2">98.9</td><td>97.3</td><td>94.6</td><td>92.4</td><td>91.2</td><td>87.9</td><td>85.8</td><td>80.2</td></tr>
<tr><td>C</td><td>11,12</td><td></td><td>87.1</td><td>84.1</td><td>82.1</td><td>80.3</td><td>75.9</td><td>73.2</td><td>66.7</td></tr>
<tr><td>D</td><td>13</td><td></td><td rowspan="2">76.1</td><td rowspan="2">74.0</td><td rowspan="2">71.0</td><td rowspan="2">68.1</td><td rowspan="2">66.6</td><td rowspan="2">65.6</td><td>64.1</td><td>62.9</td><td>58.8</td></tr>
<tr><td>E</td><td>14,15</td><td></td><td>60.5</td><td>57.5</td><td>52.2</td></tr>
<tr><td>F</td><td>16</td><td></td><td>19.8</td><td>19.0</td><td>17.8</td><td>16.9</td><td>15.3</td><td>14.8</td><td>13.5</td><td>13.2</td><td>10.2</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 6. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for POPC-d_{31} at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="5">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>15</td><td>20</td><td>30</td><td>45</td><td>55</td></tr>
<tr><td>A</td><td>2-5</td><td></td><td rowspan="2">55.3</td><td rowspan="2">54.5</td><td rowspan="2">50.7</td><td>47.5</td><td>44.2</td></tr>
<tr><td>B</td><td>6-8</td><td></td><td>44.1</td><td>40.4</td></tr>
<tr><td>C</td><td>9</td><td></td><td>50.1</td><td>50.6</td><td>44.7</td><td>40.2</td><td>36.1</td></tr>
<tr><td>D</td><td>10</td><td></td><td>47.9</td><td>47.8</td><td>41.9</td><td>37.2</td><td>33.4</td></tr>
<tr><td>E</td><td>11</td><td></td><td>42.5</td><td>42.8</td><td>37.4</td><td>32.6</td><td>29.1</td></tr>
<tr><td>F</td><td>12</td><td></td><td>39.0</td><td>38.9</td><td>33.7</td><td>29.2</td><td>25.8</td></tr>
<tr><td>G</td><td>13</td><td></td><td>33.2</td><td>33.3</td><td>28.6</td><td>24.7</td><td>21.5</td></tr>
<tr><td>H</td><td>14</td><td></td><td>27.9</td><td>28.1</td><td>24.1</td><td>20.6</td><td>17.8</td></tr>
<tr><td>I</td><td>15</td><td></td><td>21.0</td><td>21.0</td><td>17.9</td><td>15.3</td><td>13.2</td></tr>
<tr><td>J</td><td></td><td>16</td><td>6.2</td><td>6.3</td><td>5.3</td><td>4.4</td><td>3.7</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 7. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for POPC-d_{31} in binary mixture with cholesterol $X_C = 0.2$ at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="6">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>15</td><td>20</td><td>30</td><td>40</td><td>45</td><td>60</td></tr>
<tr><td>A</td><td>2-7</td><td></td><td>77.5</td><td>75.1</td><td>67.7</td><td>61.6</td><td>59.2</td><td>53.7</td></tr>
<tr><td>B</td><td>8-10</td><td></td><td rowspan="3">65.9</td><td rowspan="2">63.5</td><td rowspan="2">60.4</td><td>54.3</td><td>53.7</td><td>48.2</td></tr>
<tr><td>C</td><td>11</td><td></td><td>49.4</td><td>47.0</td><td>40.3</td></tr>
<tr><td>D</td><td>12</td><td></td><td>58.0</td><td>50.0</td><td>44.6</td><td>42.1</td><td>36.0</td></tr>
<tr><td>E</td><td>13</td><td></td><td>53.1</td><td>50.0</td><td>42.7</td><td>37.8</td><td>36.0</td><td>30.5</td></tr>
<tr><td>F</td><td>14</td><td></td><td>44.6</td><td>41.5</td><td>35.4</td><td>31.7</td><td>29.3</td><td>25.0</td></tr>
<tr><td>G</td><td>15</td><td></td><td>33.0</td><td>31.1</td><td>26.2</td><td>22.6</td><td>21.4</td><td>18.3</td></tr>
<tr><td>H</td><td>16</td><td></td><td>9.8</td><td>9.2</td><td>7.3</td><td>6.7</td><td>6.1</td><td>4.9</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 8. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for POPC-d_{31} in binary mixture with cholesterol $X_C = 0.33$ at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="10">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>38</td><td>40</td><td>45</td><td>50</td><td>60</td></tr>
<tr><td>A</td><td>2-5</td><td></td><td>106.1</td><td>103.3</td><td>99.5</td><td>96.0</td><td>92.4</td><td>87.4</td><td>85.0</td><td>80.3</td><td>74.7</td><td rowspan="2">66.5</td></tr>
<tr><td>B</td><td>6-8</td><td></td><td rowspan="2">100.5</td><td rowspan="2">97.3</td><td rowspan="2">93.2</td><td rowspan="2">89.5</td><td rowspan="2">85.7</td><td rowspan="2">80.7</td><td rowspan="2">78.3</td><td rowspan="2">76.0</td><td>71.0</td></tr>
<tr><td>C</td><td>9</td><td></td><td>67.3</td><td rowspan="2">58.3</td></tr>
<tr><td>D</td><td>10,11</td><td></td><td>94.9</td><td>92</td><td>87.7</td><td>82.5</td><td>79.0</td><td>74.2</td><td>71.9</td><td>66.8</td><td>61.7</td></tr>
<tr><td>E</td><td>12</td><td></td><td>90.0</td><td>86.7</td><td>82.2</td><td>77.8</td><td>73.8</td><td>68.2</td><td>66.2</td><td>60.8</td><td>55.4</td><td>47.9</td></tr>
<tr><td>F</td><td>13</td><td></td><td>81.4</td><td>78.0</td><td>73.6</td><td>69.5</td><td>65.5</td><td>60.0</td><td>57.4</td><td>52.6</td><td>47.4</td><td>40.4</td></tr>
<tr><td>G</td><td>14</td><td></td><td>68.9</td><td>65.8</td><td>61.7</td><td>58.0</td><td>54.4</td><td>49.7</td><td>47.5</td><td>43.2</td><td>39.0</td><td>32.8</td></tr>
<tr><td>H</td><td>15</td><td></td><td>52.7</td><td>49.9</td><td>46.4</td><td>43.3</td><td>40.4</td><td>36.7</td><td>34.9</td><td>31.6</td><td>28.3</td><td>23.8</td></tr>
<tr><td>I</td><td>16</td><td></td><td>14.3</td><td>13.5</td><td>12.5</td><td>11.6</td><td>10.8</td><td>9.8</td><td>9.4</td><td>8.5</td><td>7.6</td><td>6.2</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 9. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for PSM-d_{31}/POPC 1:1 at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="10">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>37</td><td>40</td><td>45</td><td>50</td><td>55</td></tr>
<tr><td>A</td><td>3</td><td></td><td rowspan="4">73.9</td><td rowspan="4">71.7</td><td>74.1</td><td>72.3</td><td>70.5</td><td>70.2</td><td>69.7</td><td>68.2</td><td>66.7</td><td>65.9</td></tr>
<tr><td>B</td><td>3</td><td></td><td rowspan="3">67.9</td><td rowspan="2">65.7</td><td rowspan="2">63.2</td><td rowspan="2">62.4</td><td rowspan="2">61.7</td><td>63.7</td><td>62.0</td><td>61.3</td></tr>
<tr><td>C</td><td>4-7</td><td></td><td>60.2</td><td>57.5</td><td>56.2</td></tr>
<tr><td>D</td><td>2,8,9</td><td></td><td>63.0</td><td>60.0</td><td>59.2</td><td>58.1</td><td>55.7</td><td>52.9</td><td>51.6</td></tr>
<tr><td>E</td><td>10</td><td></td><td rowspan="2">58.9</td><td rowspan="2">57.6</td><td rowspan="2">61.4</td><td rowspan="2">55.6</td><td rowspan="2">52.7</td><td rowspan="2">52.0</td><td rowspan="2">52.1</td><td rowspan="2">50.5</td><td>49.34</td><td>48.8</td></tr>
<tr><td>F</td><td>11</td><td></td><td>47.5</td><td>46.2</td></tr>
<tr><td>G</td><td>12</td><td></td><td rowspan="2">47.8</td><td rowspan="2">44.6</td><td>55.4</td><td>49.6</td><td>46.2</td><td>43.1</td><td>50.5</td><td>48.1</td><td>45.2</td><td>43.8</td></tr>
<tr><td>H</td><td>2</td><td></td><td>49.8</td><td>45.5</td><td>42.21</td><td>41.3</td><td>40.5</td><td>42.0</td><td>39.3</td><td>37.9</td></tr>
<tr><td>I</td><td>13</td><td></td><td rowspan="3">37.5</td><td rowspan="3">35.8</td><td>39.6</td><td>37.0</td><td>37.1</td><td>37.1</td><td>37.2</td><td>38.1</td><td>35.8</td><td>34.4</td></tr>
<tr><td>J</td><td>14</td><td></td><td rowspan="2">33.0</td><td rowspan="2">29.5</td><td>33.7</td><td>32.8</td><td>32.1</td><td>30.2</td><td>28.0</td><td>26.9</td></tr>
<tr><td>K</td><td>15</td><td></td><td>26.9</td><td>26.2</td><td>25.6</td><td>24.0</td><td>22.0</td><td>21.2</td></tr>
<tr><td>L</td><td>16</td><td></td><td>7.3</td><td>6.7</td><td>6.1</td><td>5.4</td><td>5.0</td><td>4.9</td><td>4.7</td><td>4.5</td><td>4.1</td><td>4.0</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 10. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for EYSM/POPC-d_{31} 1:1 at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="9">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>peak</td><td>i</td><td>T/°C</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td><td>50</td><td>60</td></tr>
<tr><td>A</td><td>2-5</td><td></td><td rowspan="7">56.8</td><td rowspan="2">55.2</td><td rowspan="2">54.5</td><td rowspan="2">52.9</td><td rowspan="2">51.0</td><td rowspan="2">48.8</td><td rowspan="2">47.3</td><td rowspan="2">45.6</td><td>43.4</td></tr>
<tr><td>B</td><td>6-8</td><td></td><td>39.6</td></tr>
<tr><td>C</td><td>9</td><td></td><td rowspan="3">51.2</td><td rowspan="3">49.0</td><td>49.3</td><td>47.3</td><td rowspan="2">44.5</td><td rowspan="2">42.6</td><td>40.7</td><td>36.4</td></tr>
<tr><td>D</td><td>10</td><td></td><td>47.4</td><td>44.9</td><td>37.6</td><td>33.5</td></tr>
<tr><td>E</td><td>11</td><td></td><td>41.9</td><td>39.6</td><td>37.2</td><td>35.0</td><td>33.1</td><td>29.3</td></tr>
<tr><td>F</td><td>12</td><td></td><td>41.3</td><td>39.6</td><td>37.6</td><td>35.6</td><td>33.3</td><td>31.5</td><td>29.4</td><td>25.8</td></tr>
<tr><td>G</td><td>13</td><td></td><td>35.2</td><td>34.3</td><td>32.0</td><td>30.1</td><td>28.1</td><td>26.3</td><td>24.6</td><td>21.4</td></tr>
<tr><td>H</td><td>14</td><td></td><td>32.0</td><td>29.6</td><td>28</td><td>26.6</td><td>24.9</td><td>23.4</td><td>21.5</td><td>20.2</td><td>17.5</td></tr>
<tr><td>I</td><td>15</td><td></td><td>23.0</td><td>21.8</td><td>20.7</td><td>19.5</td><td>18.2</td><td>17.1</td><td>16.0</td><td>15.0</td><td>13.0</td></tr>
<tr><td>J</td><td>16</td><td></td><td>6.7</td><td>6.1</td><td>5.7</td><td>5.4</td><td>5.0</td><td>4.8</td><td>4.4</td><td>4.1</td><td>3.7</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 11. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for PSM-d_{31}/POPC 1:1 with cholesterol $X_C = 0.33$ at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="10">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>Peak</td><td>i</td><td>T/°C</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>38</td><td>40</td><td>45</td><td>50</td><td>60</td></tr>
<tr><td>A</td><td>3-9</td><td></td><td>111.0</td><td>109.1</td><td>106.6</td><td>103.2</td><td>99.9</td><td>97.5</td><td>95.2</td><td>91.6</td><td>87.2</td><td rowspan="2">79.5</td></tr>
<tr><td>B</td><td>10-13</td><td></td><td>99.7</td><td>95.8</td><td>91.9</td><td>89.1</td><td>86.9</td><td>84.2</td><td>84.4</td><td>81.4</td><td>78.8</td></tr>
<tr><td>C</td><td>14</td><td></td><td>89.0</td><td>85.0</td><td>81.4</td><td>76.5</td><td>71.9</td><td>69.5</td><td>68.2</td><td>63.5</td><td rowspan="2">58.6</td><td rowspan="2">52.0</td></tr>
<tr><td>E</td><td>2</td><td></td><td rowspan="2">73.4</td><td rowspan="2">70.4</td><td rowspan="2">66.2</td><td rowspan="2">62.3</td><td>63.2</td><td>62</td><td>61.4</td><td>60.0</td></tr>
<tr><td>F</td><td>15</td><td></td><td>59.0</td><td>55.3</td><td>53.7</td><td>50.8</td><td>47.1</td><td>40.2</td></tr>
<tr><td>G</td><td>16</td><td></td><td>18.6</td><td>17.3</td><td>15.9</td><td>14.4</td><td>13.4</td><td>12.4</td><td>12.0</td><td>10.9</td><td>10.0</td><td>8.3</td></tr>
</table>

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 12. ^{2}H NMR spectral assignments and $\Delta\nu_Q$ splittings for EYSM/POPC-d_{31} 1:1 with cholesterol $X_C = 0.33$ at various temperatures

<table>
<tr><td></td><td>carbon</td><td></td><td colspan="10">$\Delta\nu_Q$/kHz[a]</td></tr>
<tr><td>Peak</td><td>i</td><td>T/°C</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>38</td><td>40</td><td>45</td><td>50</td><td>60</td></tr>
<tr><td>A</td><td>3-6</td><td></td><td rowspan="2">109.1</td><td rowspan="2">106.3</td><td>103.8</td><td>100.7</td><td>97.2</td><td>92.3</td><td>89.9</td><td>85.7</td><td>80.6</td><td rowspan="2">71.4</td></tr>
<tr><td>B</td><td>7-9</td><td></td><td>98.7</td><td>94.1</td><td>89.9</td><td>85.5</td><td>83.4</td><td>79.2</td><td>75.1</td></tr>
</table>

C	10,11				93.4	89	85.1	80.1	77.4	72	67.9	60.0
D	12,2		93.6	90.76	86.8	82.8	78.8	74.0	71.5	66.9	62.7	54.6
E	13		83.6	81.1	77.4	73.2	69.2	64.2	61.8	57.6	53.6	45.7
F	14		70.4	68.2	64.4	60.5	57.0	52.7	50.7	46.9	43.4	36.8
G	15		52.5	50.3	47.4	44.3	41.4	38.1	36.5	33.7	30.9	26.0
H	16		13.8	13.2	12.4	11.5	10.8	9.9	9.5	8.7	7.9	6.6

[a] Quadrupolar splitting corresponding to $\theta = 0°$ bilayer orientation.

Table 13. Summary of structural results for PSM-d_{31} and POPC-d_{31} components in binary mixtures with cholesterol

	T/°C	D_C /Å^{a}	$\langle A\rangle$/Å$^{2\ b}$	$\alpha_{\parallel}$/10^{-3} K$^{-1\ c}$	$\alpha_{\perp}$/10^{-3} K$^{-1\ d}$	L_C^*/Å ^{e}	L_C/Å ^{f}
PSM-d_{31} $X_C = 0$	20	19.8	21.9	-0.3	0.9	16.4	18.4
	30	19.1	23.0	-8.8	11.9	15.8	17.7
	45	15.7	28.5	-4.0	6.5	12.8	14.3
	55	14.9	30.4	-0.1	0.5	12.3	13.6
$X_C = 0.15$	20	18.9	23.0	-1.6	2.9	16.6	19.0
	30	18.3	24.1	-5.3	6.5	16.1	18.4
	45	17.2	26.0	-1.8	2.9	14.2	16.0
	55	16.6	27.3	-7.0	7.9	13.9	15.5
$X_C = 0.20$	20	19.7	22.0	-1.0	2.0	16.7	18.9
	30	19.3	22.8	-4.8	6.2	16.4	18.5
	45	17.2	26.0	-6.2	7.6	15.0	17.0
	60	16.4	27.8	-0.6	1.4	14.3	16.0
$X_C = 0.33$	20	19.6	22.1	-0.6	1.7	16.3	18.6
	30	19.4	22.7	-1.4	2.7	16.0	18.2
	45	18.7	23.9	-2.7	3.8	15.4	17.5
	60	18.1	25.1	-1.9	3.2	14.8	16.9
POPC-d_{31} $X_C =$	20	14.7	29.5	-2.5	3.7	12.1	13.6
	30	14.3	30.8			11.6	13.0
	45	13.9	32.2			11.1	12.4
	55	13.4	33.7			10.6	11.9

$X_C = 0.20$	20	16.8	25.9	-3.5	4.6	13.8	15.5
	30	16.1	27.3			13.3	14.8
	45	15.3	29.3			12.5	14.0
	60	14.7	31.1			11.9	13.3
$X_C = 0.33$	20	19.0	22.9	-2.0	3.1	15.7	17.7
	30	18.5	23.8	-3.6	4.8	15.2	17.1
	45	17.3	25.9	-5.4	6.5	14.1	15.8
	60	16.0	28.4	-4.0	5.3	13.1	14.7

[a] hydrocarbon thickness of one acyl chain (Eq. 10), [b] average cross-sectional chain area (eq. 9), [c] isobaric thermal expansion coefficient parallel to the membrane normal (eq. 18), [d] isobaric thermal expansion coefficient perpendicular to the membrane normal (Eq 19), [e] average chain length C3 to C15 (eq. 7), [f] estimated average chain length C2 to C16 (eq. 8).