

## Supporting Information

### Complete radiationless energy transfer from excited triplet state of a dim phosphor to a covalently linked adjacent fluorescent dye in purely organic tandem luminophores

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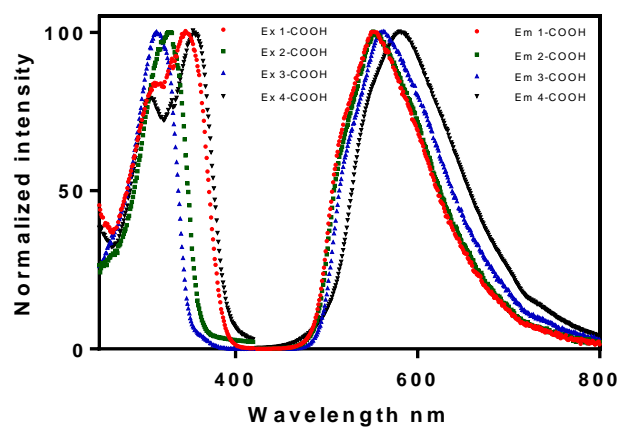


Figure S11. Excitation and emission spectra of phosphorescence of carboxylic acid analogues of **1-4**. 6-10 nmol of **1-4** in 0.7 mg of PVA *per well* were used.

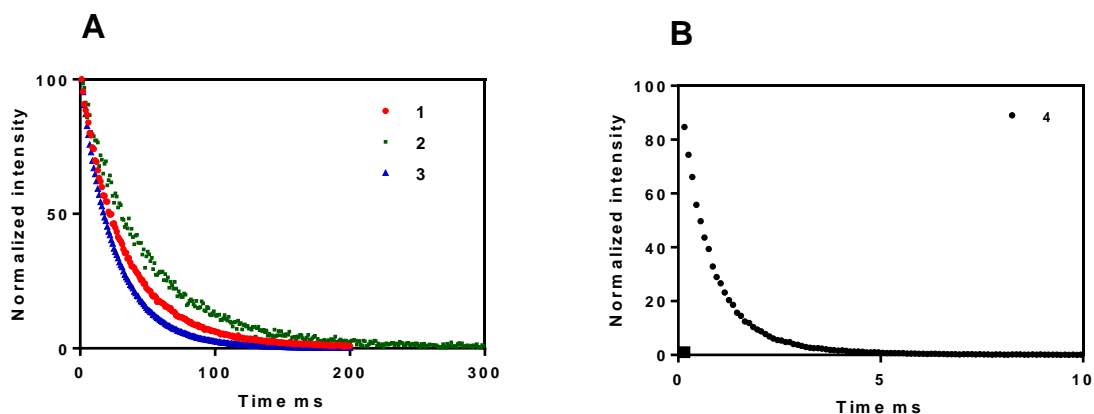


Figure S12. Phosphorescence decays of **1-3** (A) and **4** (B) in PVA.

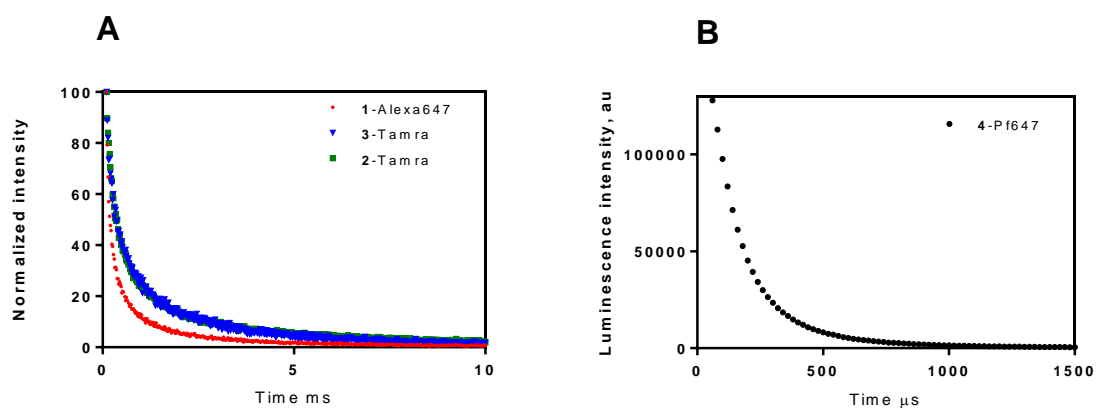


Figure S13. Luminescence decays of donor-acceptor compounds in PVA.

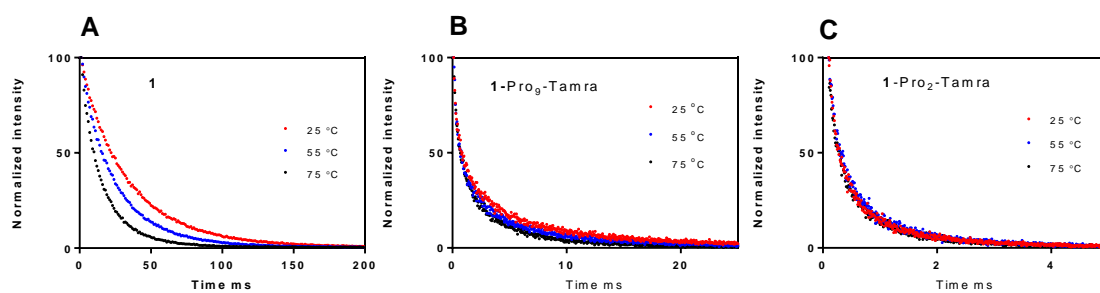


Figure S14. Temperature dependence of luminescence decays of compounds in PVA.

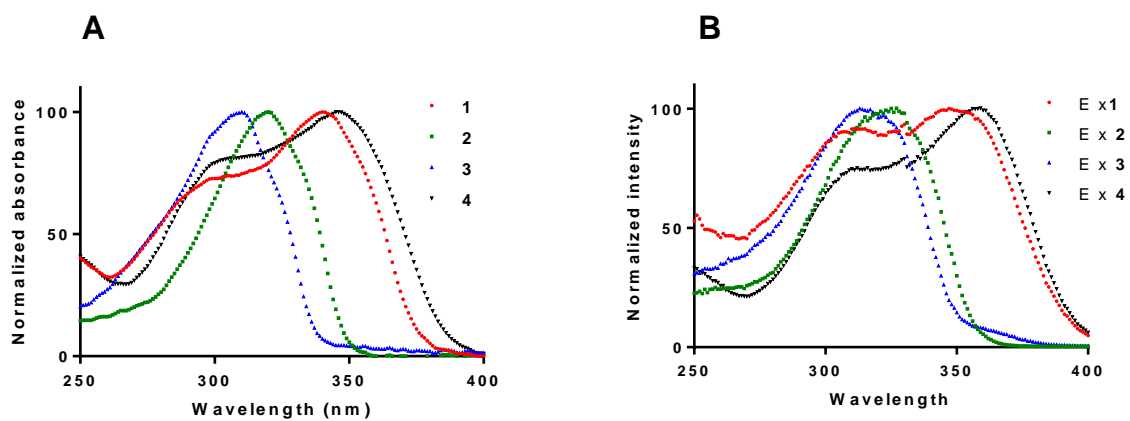
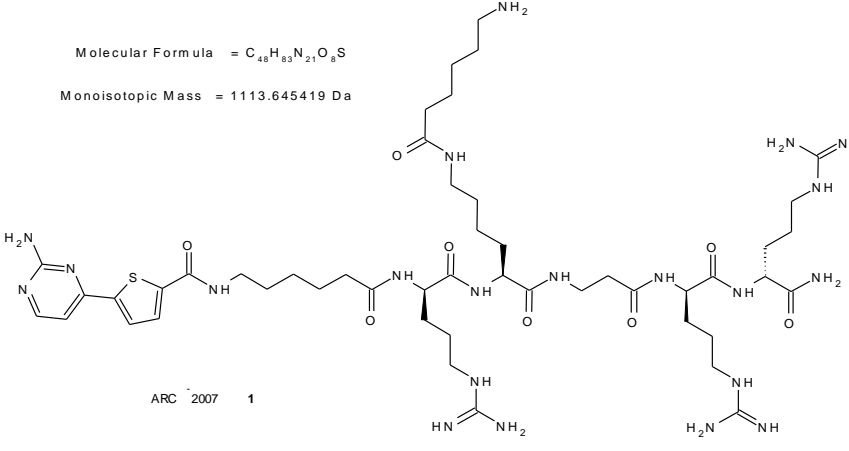
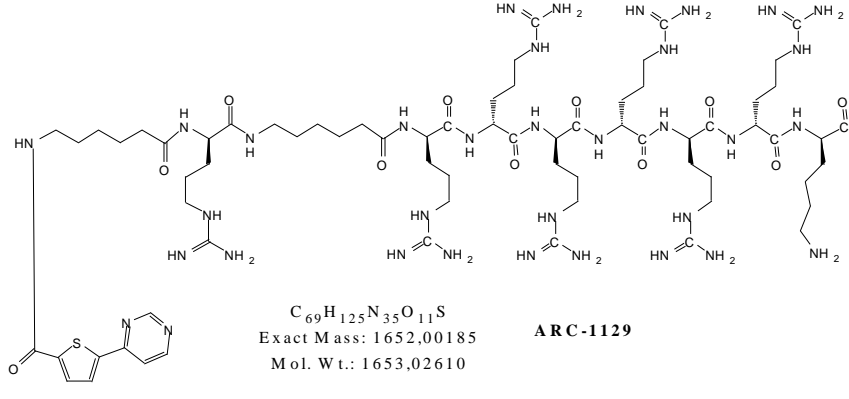
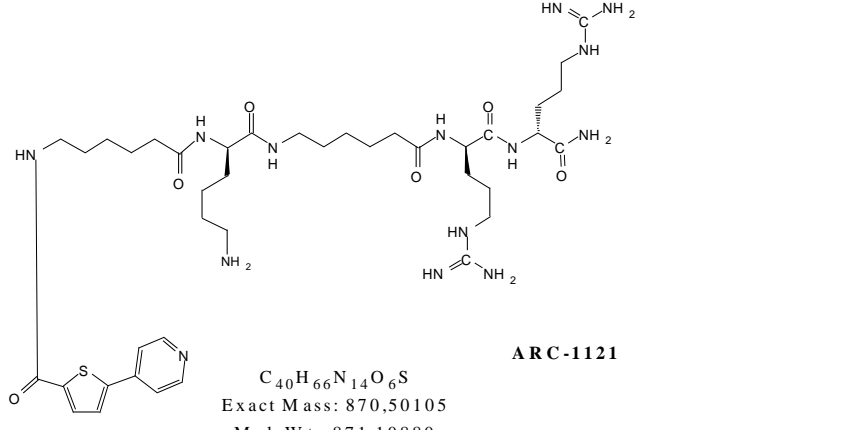
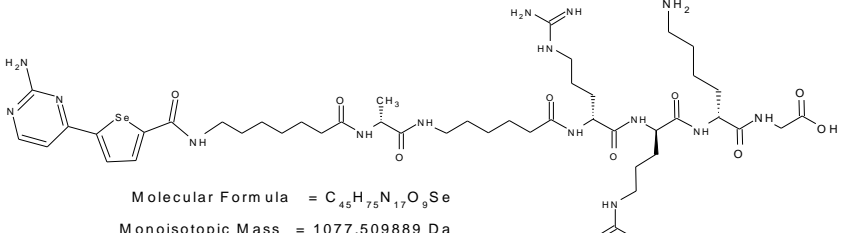
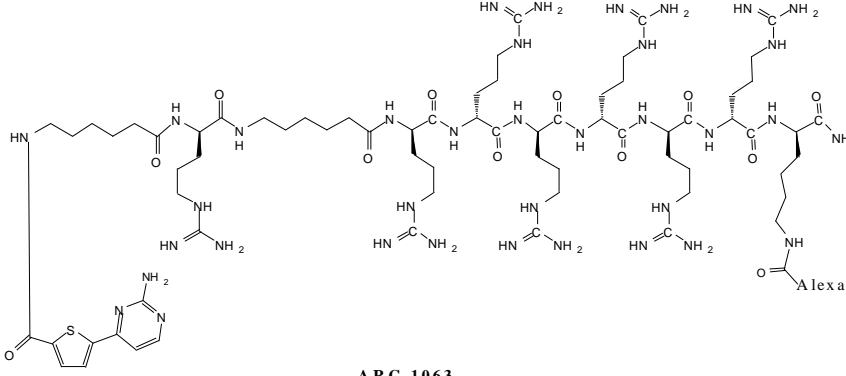
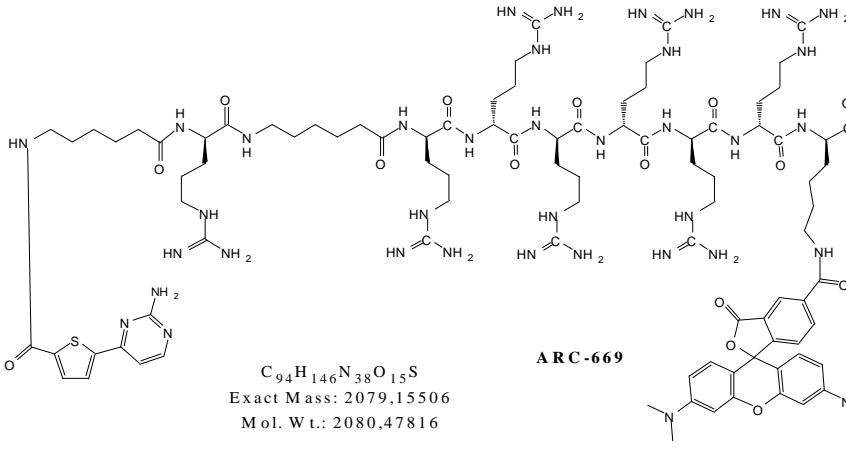
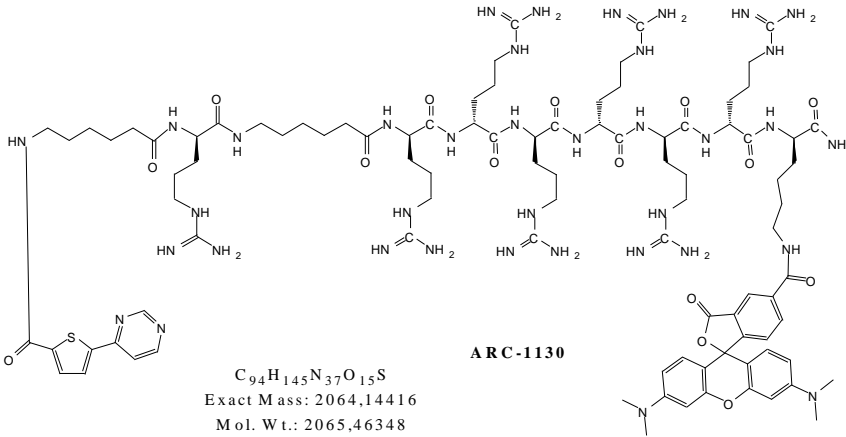
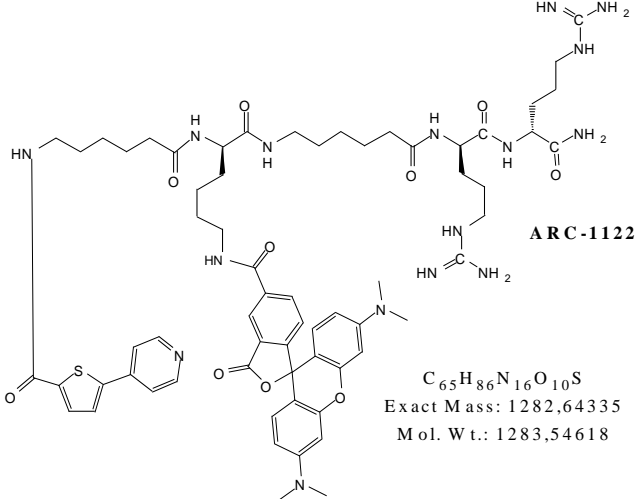
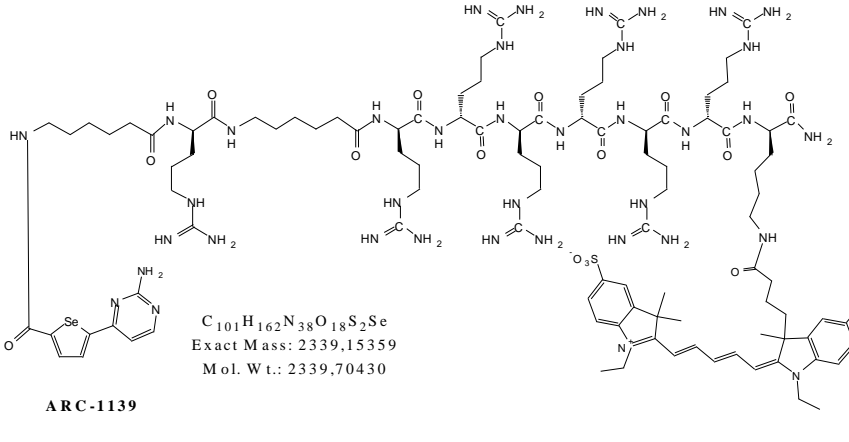
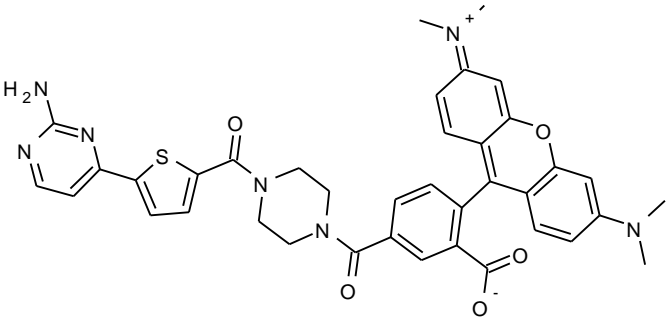


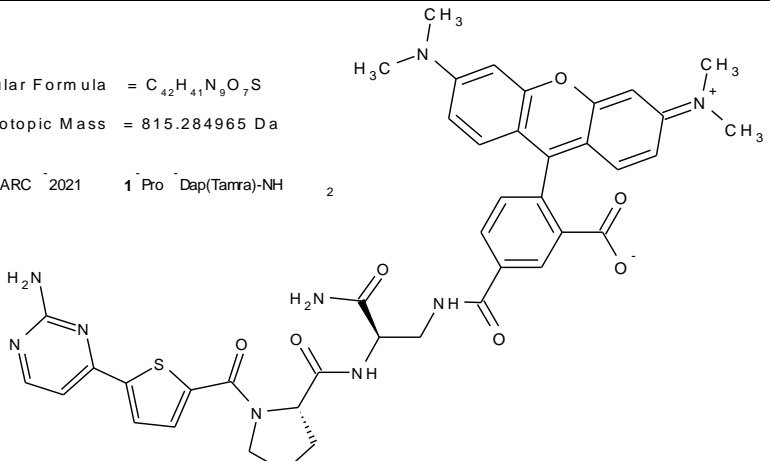
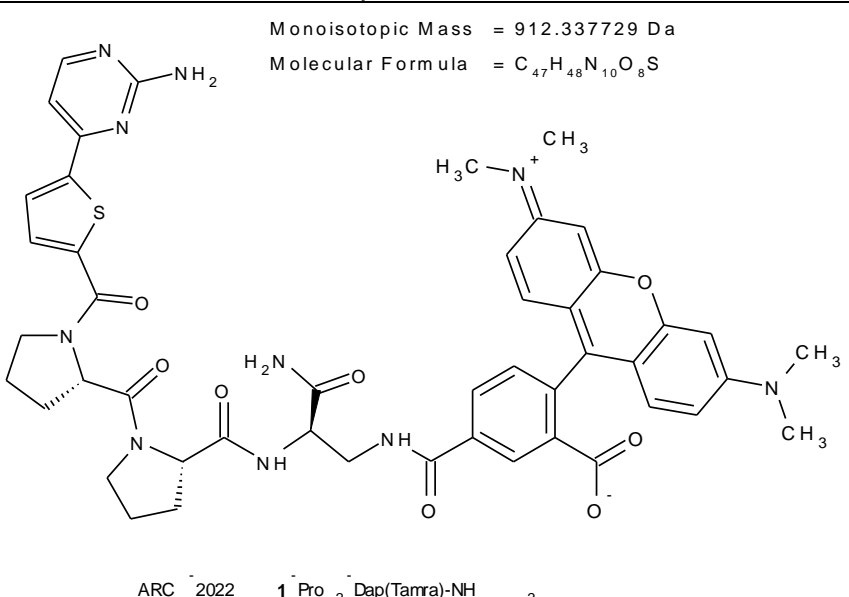
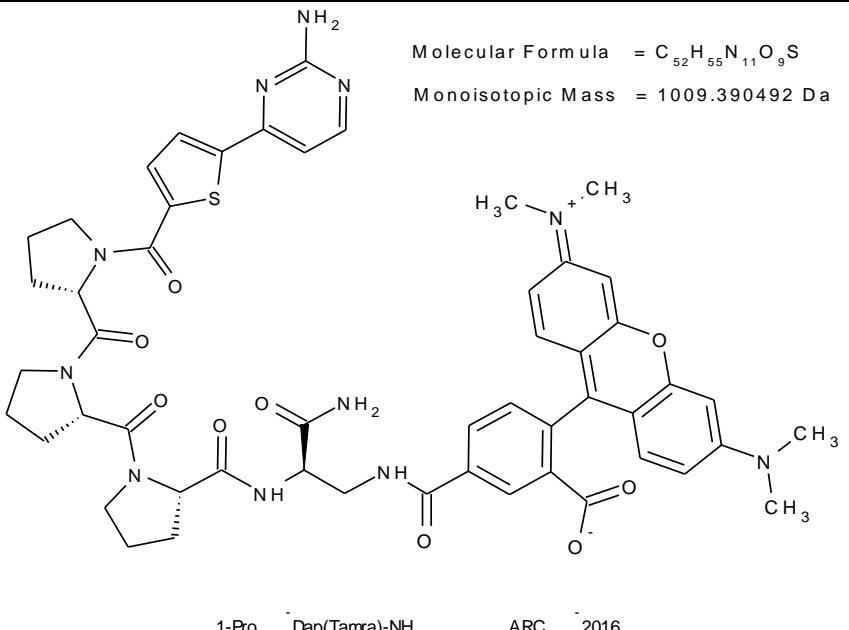
Figure SI5. A) Normalized UV-spectra of **1** – **4**. B) Normalized phosphorescence excitation spectra of **1** – **4**. Minor differences between absorption and excitation spectra are probably mainly caused by slit width used in the measurements of excitation spectra.

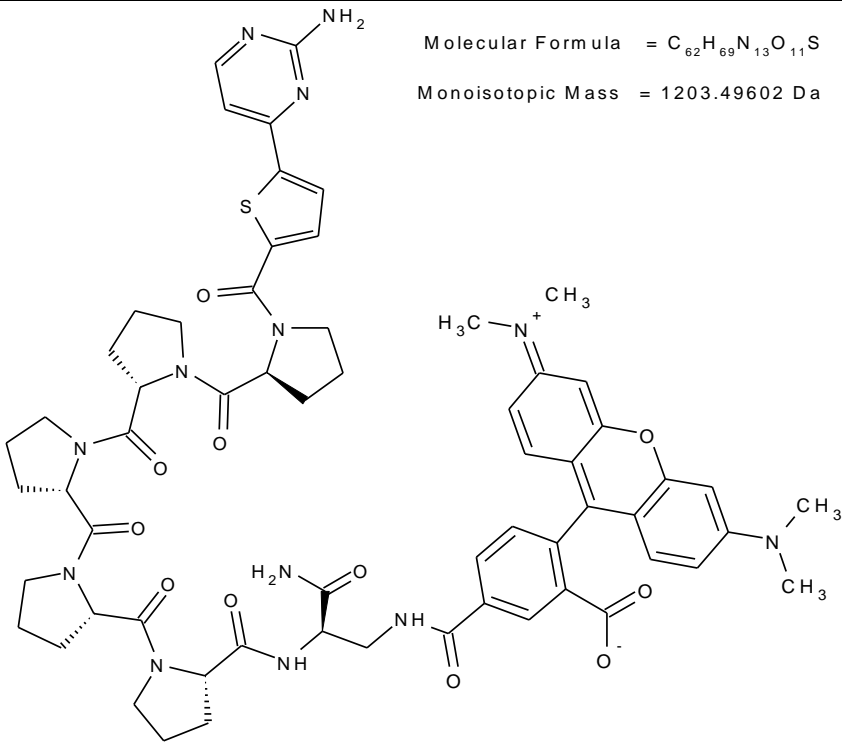
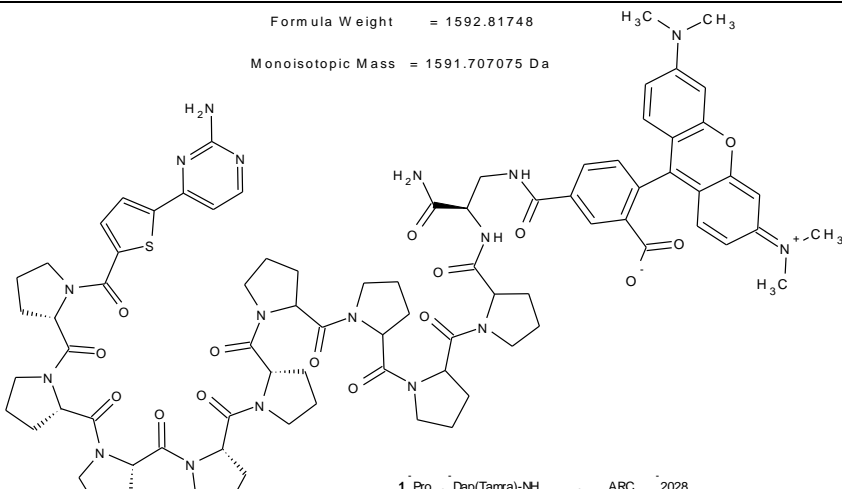
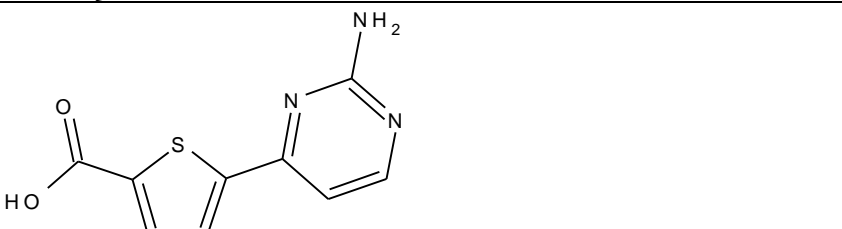
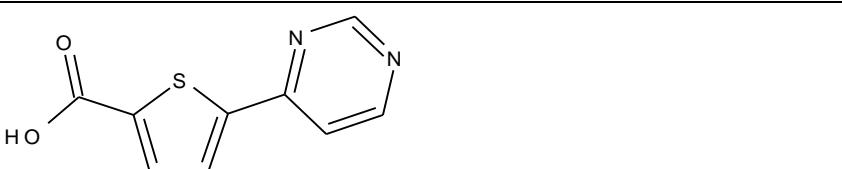
SI Table 1. Table of full structures

Compound codes	Structure	Reference or HRMS
<p><b>1</b> (ARC-2007)</p>	<p>Molecular Formula = C<sub>48</sub>H<sub>83</sub>N<sub>21</sub>O<sub>6</sub>S</p> <p>Monoisotopic Mass = 1113.645419 Da</p>  <p>ARC 2007 1</p>	<p>1113.6447</p>
<p><b>2</b> (ARC-1129)</p>	 <p>C<sub>69</sub>H<sub>125</sub>N<sub>35</sub>O<sub>11</sub>S</p> <p>Exact Mass: 1652.00185</p> <p>Mol. Wt.: 1653.02610</p> <p>ARC-1129</p>	<p>[1]</p>
<p><b>3</b> (ARC-1121)</p>	 <p>C<sub>40</sub>H<sub>66</sub>N<sub>14</sub>O<sub>6</sub>S</p> <p>Exact Mass: 870.50105</p> <p>Mol. Wt.: 871.10880</p> <p>ARC-1121</p>	<p>[1]</p>
<p><b>4</b> (ARC-1180)</p>	 <p>Molecular Formula = C<sub>45</sub>H<sub>75</sub>N<sub>17</sub>O<sub>9</sub>Se</p> <p>Monoisotopic Mass = 1077.509889 Da</p> <p>ARC-1180</p>	<p>1077.5105</p>

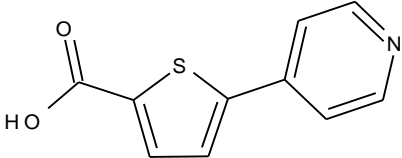
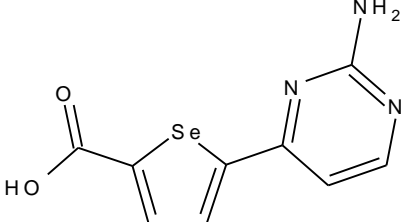
<p><b>1-Alexa647</b> (ARC-1063)</p>	 <p style="text-align: center;"><b>ARC-1063</b></p>	<p>[1]</p>
<p><b>1-Tamra</b> (ARC-669)</p>	 <p style="text-align: center;"><b>ARC-669</b></p> <p style="text-align: center;"> <math>C_{94}H_{146}N_{38}O_{15}S</math>            Exact Mass: 2079,15506            Mol. Wt.: 2080,47816         </p>	<p>[1]</p>
<p><b>2-Tamra</b> (ARC-1130)</p>	 <p style="text-align: center;"><b>ARC-1130</b></p> <p style="text-align: center;"> <math>C_{94}H_{145}N_{37}O_{15}S</math>            Exact Mass: 2064,14416            Mol. Wt.: 2065,46348         </p>	<p>[1]</p>

<p><b>3-Tamra</b> (ARC-1122)</p>	 <p style="text-align: center;"><b>ARC-1122</b></p> <p style="text-align: center;">C<sub>65</sub>H<sub>86</sub>N<sub>16</sub>O<sub>10</sub>S Exact Mass: 1282,64335 Mol. Wt.: 1283,54618</p>	<p>[1]</p>
<p><b>4-PF647</b> (ARC-1139)</p>	 <p style="text-align: center;"><b>ARC-1139</b></p> <p style="text-align: center;">C<sub>101</sub>H<sub>162</sub>N<sub>38</sub>O<sub>18</sub>S<sub>2</sub>Se Exact Mass: 2339,15359 Mol. Wt.: 2339,70430</p>	<p>[1]</p>
<p><b>1-Pip-Tamra</b> (ARC-2024)</p>	<p>Molecular Formula = C<sub>38</sub>H<sub>35</sub>N<sub>7</sub>O<sub>5</sub>S</p> <p>Monoisotopic Mass = 701.242037 Da</p>  <p style="text-align: center;">ARC 2024 1 Pip Tamra</p>	<p>701.2405</p>

<p><b>1-Pro-Dap(Tamra)-NH<sub>2</sub></b> (ARC-2021)</p>	<p>Molecular Formula = C<sub>42</sub>H<sub>41</sub>N<sub>9</sub>O<sub>7</sub>S Monoisotopic Mass = 815.284965 Da</p> <p>ARC 2021 1 Pro Dap(Tamra)-NH 2</p>  <p>The structure shows a Tamra fluorophore (6-methylrhodamine) linked via an amide bond to a Dap peptide backbone. The peptide backbone consists of a proline ring, a lysine residue, and a lysine residue with a terminal primary amide group. The Tamra moiety is a xanthene derivative with a methyl group on the nitrogen and a carboxylate group at the 2-position.</p>	<p>815.2837</p>
<p><b>1-Pro<sub>2</sub>-Dap(Tamra)-NH<sub>2</sub></b> (ARC-2021)</p>	<p>Monoisotopic Mass = 912.337729 Da Molecular Formula = C<sub>47</sub>H<sub>48</sub>N<sub>10</sub>O<sub>8</sub>S</p>  <p>The structure shows a Tamra fluorophore linked via an amide bond to a Dap peptide backbone. The peptide backbone consists of a proline ring, a lysine residue, and a lysine residue with a terminal primary amide group. The Tamra moiety is a xanthene derivative with a methyl group on the nitrogen and a carboxylate group at the 2-position.</p> <p>ARC 2022 1 Pro<sub>2</sub> Dap(Tamra)-NH 2</p>	<p>912.3369</p>
<p><b>1-Pro<sub>3</sub>-Dap(Tamra)-NH<sub>2</sub></b> (ARC-2016)</p>	<p>Molecular Formula = C<sub>52</sub>H<sub>55</sub>N<sub>11</sub>O<sub>9</sub>S Monoisotopic Mass = 1009.390492 Da</p>  <p>The structure shows a Tamra fluorophore linked via an amide bond to a Dap peptide backbone. The peptide backbone consists of a proline ring, a lysine residue, and a lysine residue with a terminal primary amide group. The Tamra moiety is a xanthene derivative with a methyl group on the nitrogen and a carboxylate group at the 2-position.</p> <p>1-Pro<sub>3</sub> Dap(Tamra)-NH 2 ARC 2016</p>	<p>1009.3886</p>

<p><b>1-Pro<sub>5</sub>-Dap(Tamra)-NH<sub>2</sub></b> (ARC-2017)</p>	 <p>Molecular Formula = C<sub>62</sub>H<sub>69</sub>N<sub>13</sub>O<sub>11</sub>S Monoisotopic Mass = 1203.49602 Da</p> <p>1-Pro<sub>5</sub>-Dap(Tamra)-NH<sub>2</sub> ARC 2017</p>	<p>1203.4968</p>
<p><b>1-Pro<sub>9</sub>-Dap(Tamra)-NH<sub>2</sub></b> (ARC-2028)</p>	 <p>Formula Weight = 1592.81748 Monoisotopic Mass = 1591.707075 Da</p> <p>1-Pro<sub>9</sub>-Dap(Tamra)-NH<sub>2</sub> ARC 2028</p>	<p>1591.7086</p>
<p><b>1-COOH</b></p>		<p>[1]</p>
<p><b>2-COOH</b></p>		<p>[1]</p>



3-COOH		[1]
4-COOH		[1]

## SI references

- 1) E. Enkvist, A. Vaasa, M. Kasari, M. Kriisa, T. Ivan, K. Ligi, G. Raidaru, A. Uri, *ACS Chem. Biol.* **2011**, *6*, 1052 –1062.