Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry

Supporting Information

for the manuscript entitled

Porphyrin-DNA conjugates: porphyrin induced adenine-guanine homoduplex stabilization and interduplex assemblies

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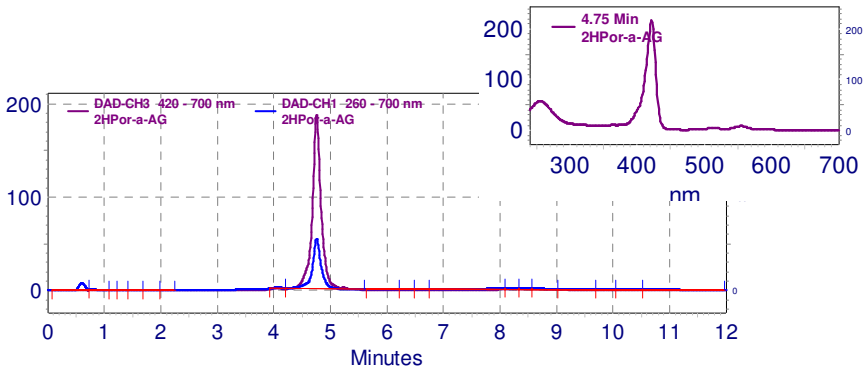

Figure S1: HPLC chromatogram of the DNA-porphyrin conjugate **2HPor-5'a-(dAdG)$_4$** monitored at 420 (purple) and 260 nm (blue). Inset: UV-vis absorption profile of the peak recorded by PDA detector.

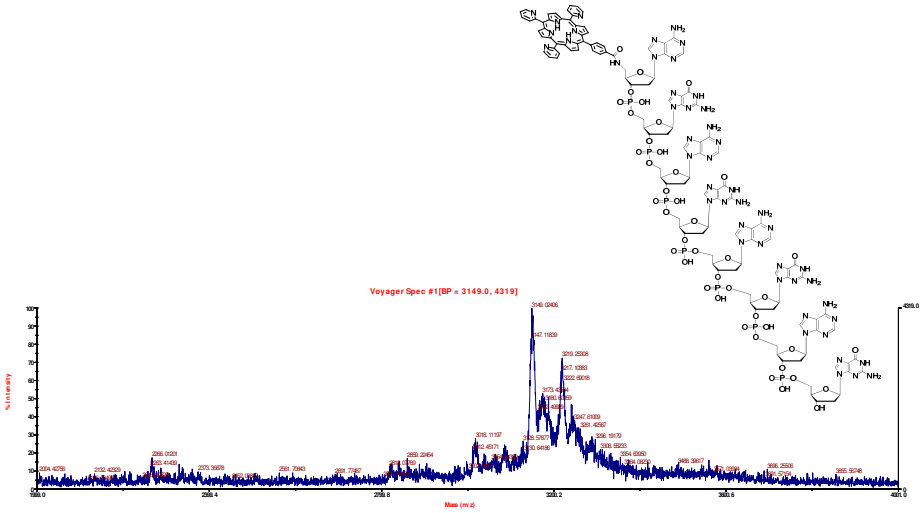

Figure S2: MALDI-TOF MS of **2HPor-5'a-(dAdG)$_4$** m/z MALDI-TOF 3149.02408 ($C_{122}H_{124}N_{48}O_{42}P_7$, $[M-H]^+$ requires 3149.72060).

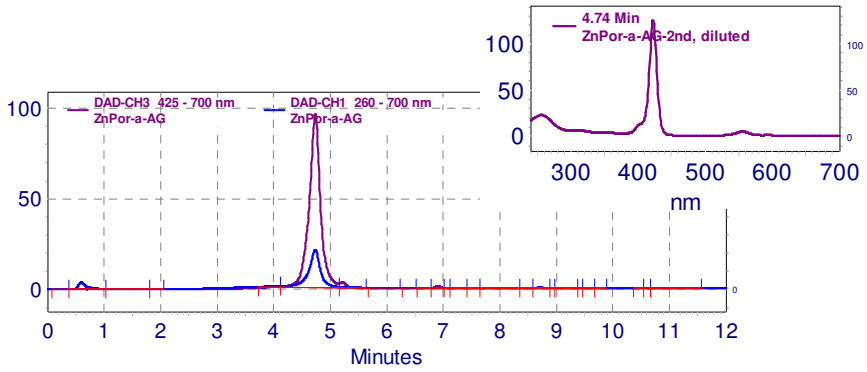

Figure S3: HPLC chromatogram of the DNA-porphyrin conjugate **ZnPor-5'a-d(dAdG)$_4$** monitored at 425 (purple) and 260 nm (blue). Inset: UV-vis absorption profile of the peak recorded by PDA detector.

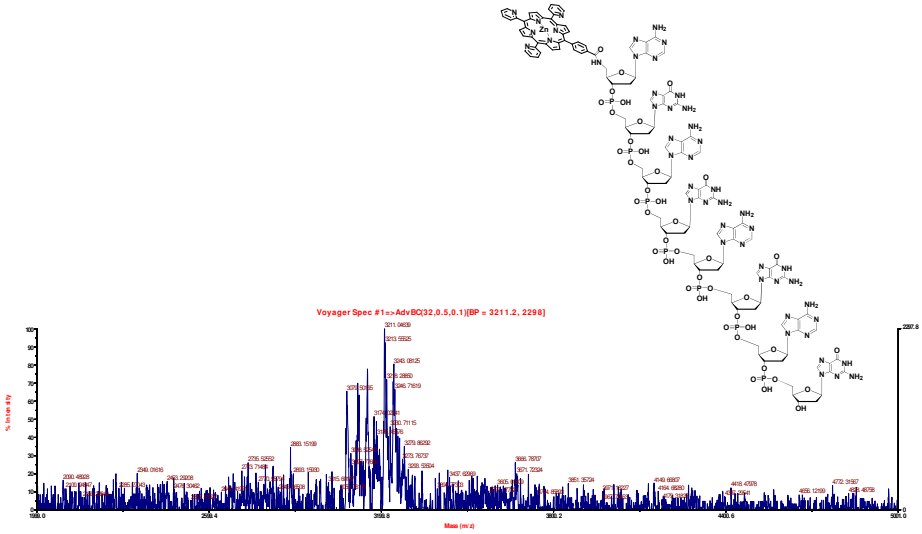

Figure S4: MALDI-TOF MS of **ZnPor-5'a-(dAdG)$_4$** m/z MALDI-TOF 3211.04639 ($C_{122}H_{122}N_{48}O_{42}P_7Zn$, $[M-H]^+$ requires 3211.63410).

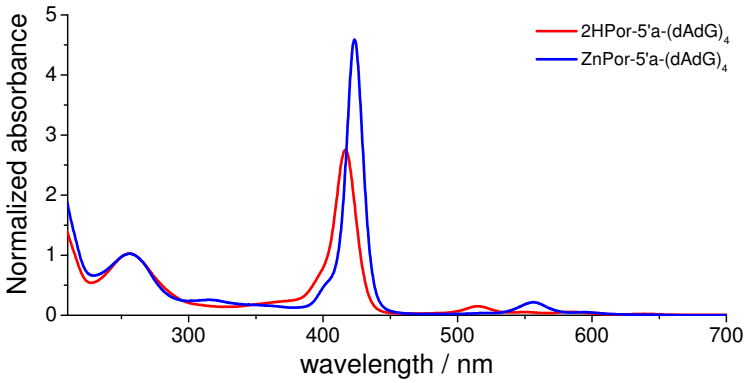

Figure S5: Absorption spectra of **2HPor-5'a-(dAdG)$_4$** (red curve) and **ZnPor-5'a-(dAdG)$_4$** (blue curve).

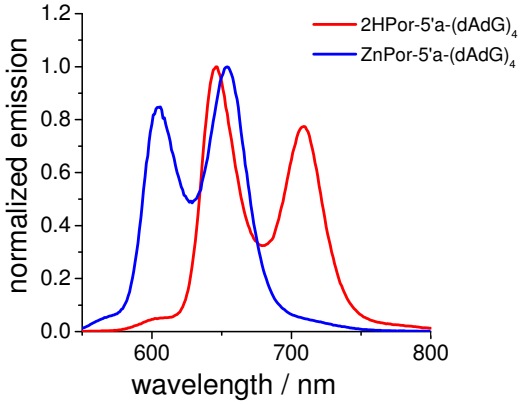

Figure S6: Emission spectra of **2HPor-5'a-(dAdG)$_4$** (red curve, λ_{ex} = **417** nm) and **ZnPor-5'a-(dAdG)$_4$** (blue curve, λ_{ex} = **425** nm) .

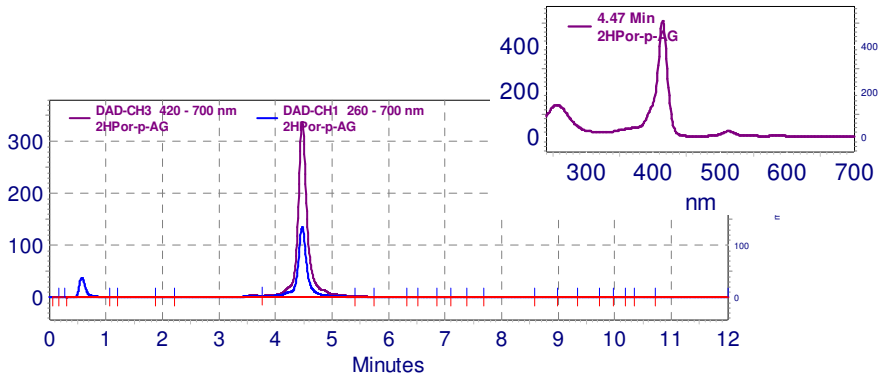

Figure S7: HPLC chromatogram of the DNA-porphyrin conjugate **2HPor-5'p-(dAdG)$_4$** monitored at 420 (purple) and 260 nm (blue). Inlet: UV-vis absorption profile of the peak recorded by PDA detector.

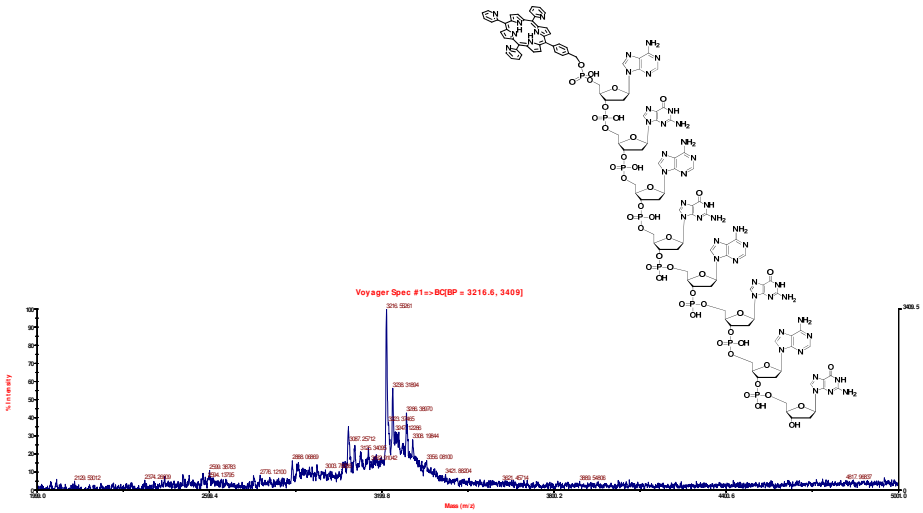

Figure S8: MALDI-TOF MS of **2HPor-5'p-(dAdG)$_4$** m/z MALDI-TOF 3216.55261 ($C_{122}H_{126}N_{47}O_{45}P_8$, $[M-H]^+$ requires 3216.69168).

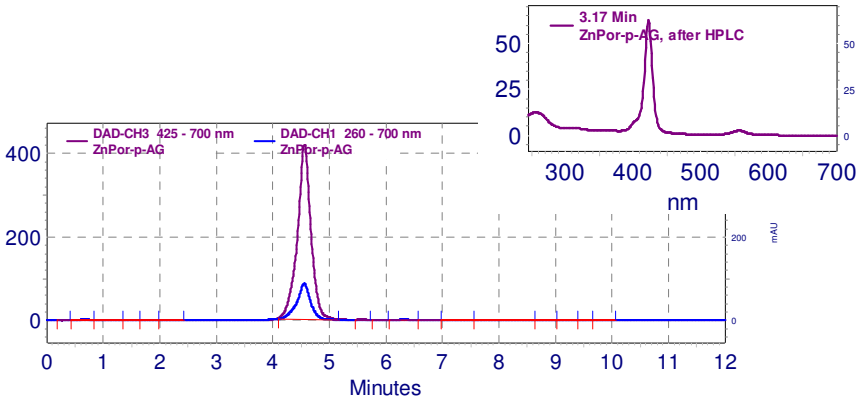

Figure S9: HPLC chromatogram of the DNA-porphyrin conjugate **ZnPor-5'p-(dAdG)$_4$** monitored at 420 (purple) and 260 nm (blue). Inlet: UV-vis absorption profile of the peak recorded by PDA detector.

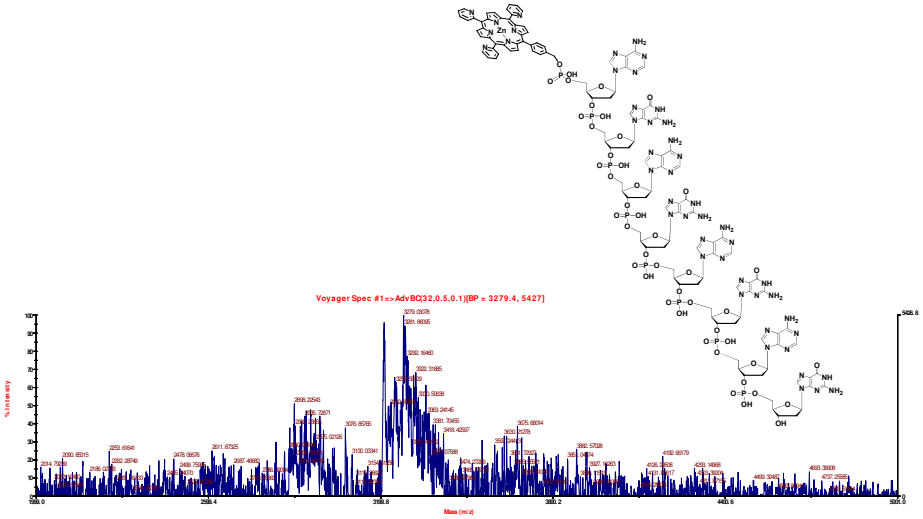

Figure S10: MALDI-TOF MS of **ZnPor-5'p-(dAdG)$_4$** m/z MALDI-TOF 3279.03078 ($C_{122}H_{124}N_{47}O_{45}P_8Zn$, $[M-H]^+$ requires 3278.60518).

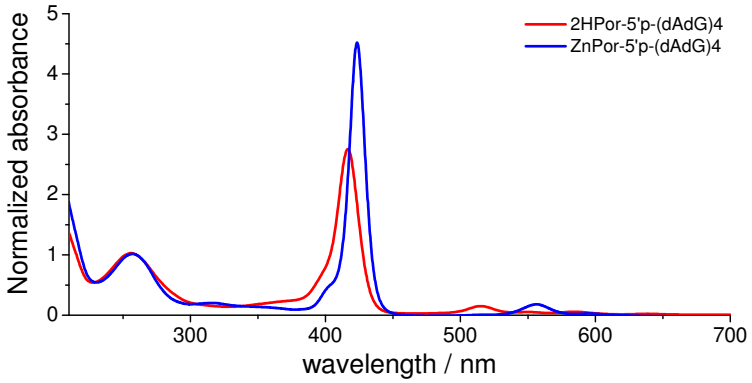

Figure S11: Absorption spectra of **2HPor-5'p-(dAdG)$_4$** (red curve) and **ZnPor-5'p-(dAdG)$_4$** (blue curve).

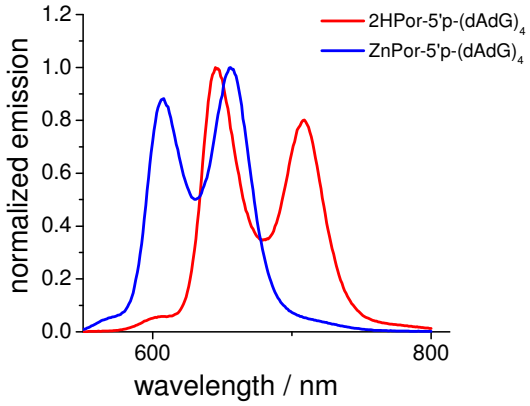

Figure S12: Emission spectra of **2HPor-5'p-(dAdG)$_4$** (red curve, λ_{ex} = **417** nm) and **ZnPor-5'p-(dAdG)$_4$** (blue curve, λ_{ex} = **425** nm) .

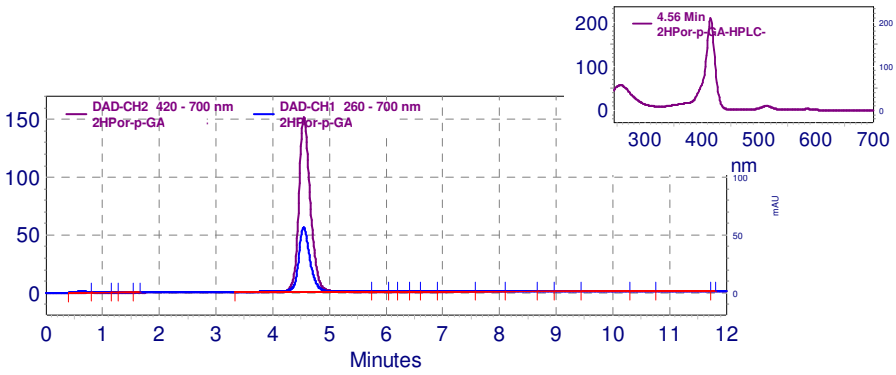

Figure S13: HPLC chromatogram of the DNA-porphyrin conjugate **2HPor-5'p-(dGdA)$_4$** monitored at 420 (purple) and 260 nm (blue). Inlet: UV-vis absorption profile of the peak recorded by PDA detector.

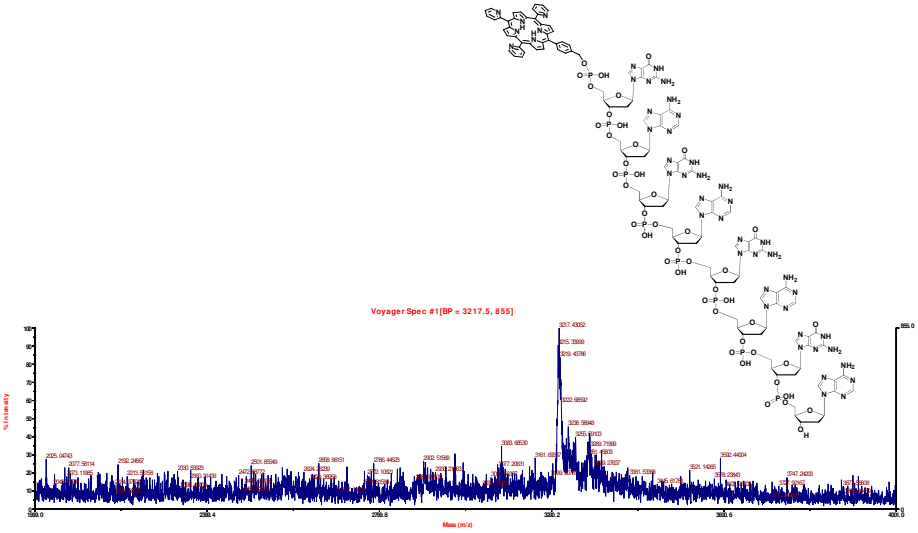

Figure S14: MALDI-TOF MS of **2HPor-5'p-(dGdA)$_4$** m/z MALDI-TOF 3217.43052 ($C_{122}H_{126}N_{47}O_{45}P_8$, $[M-H]^+$ requires 3216.69168).

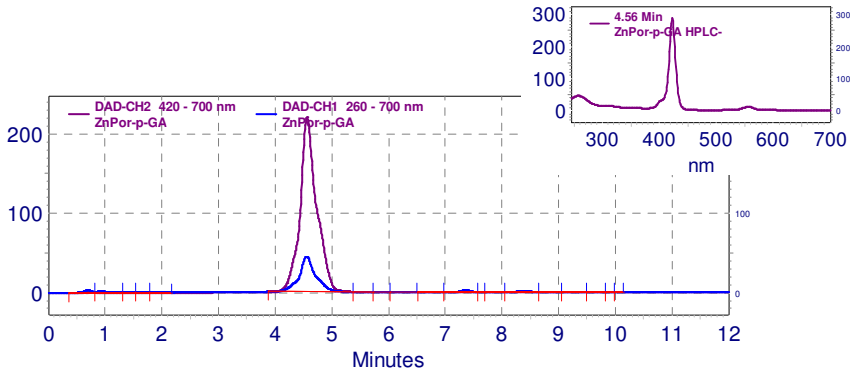

Figure S15: HPLC chromatogram of the DNA-porphyrin conjugate **ZnPor-5'p-(dGdA)$_4$** monitored at 420 (purple) and 260 nm (blue). Inlet: UV-vis absorption profile of the peak recorded by PDA detector.

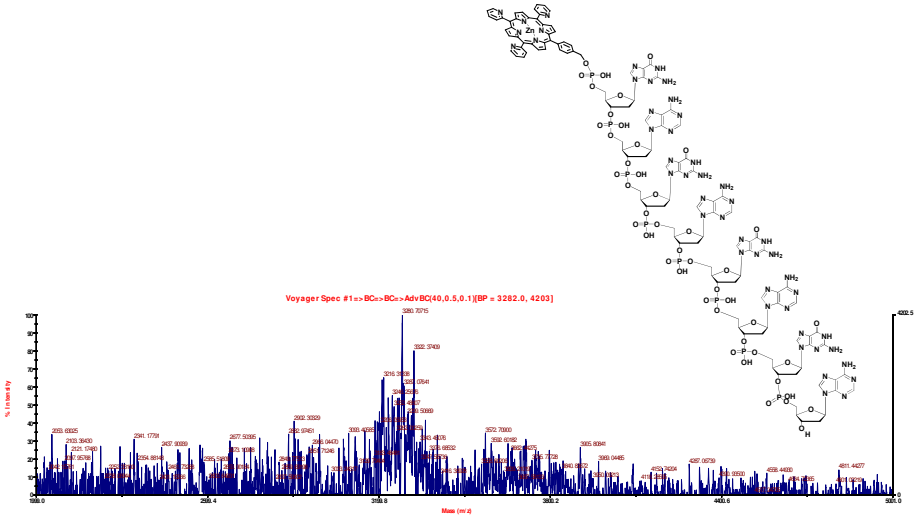

Figure S16: MALDI-TOF MS of **ZnPor-5'p-(dGdA)$_4$** m/z MALDI-TOF 3280.70715 ($C_{122}H_{124}N_{47}O_{45}P_8Zn$, $[M-H]^+$ requires 3278.60518).

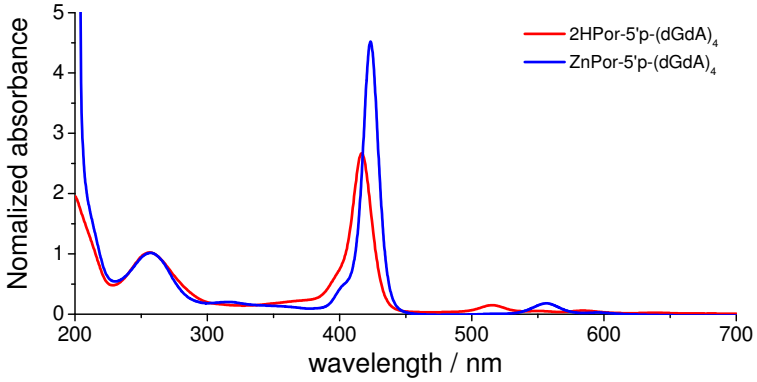

Figure S17: Absorption spectra of **2HPor-5'p-d(dGdA)$_4$** (red curve) and **ZnPor-5'p-(dGdA)$_4$** (blue curve).

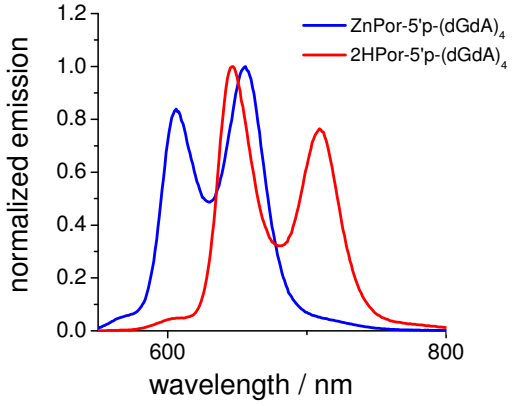

Figure S18: Emission spectra of **2HPor-5'p-(dGdA)$_4$** (red curve, λ_{ex} = **417** nm) and **ZnPor-5'p-(dGdA)$_4$** (blue curve, λ_{ex} = **425** nm) .

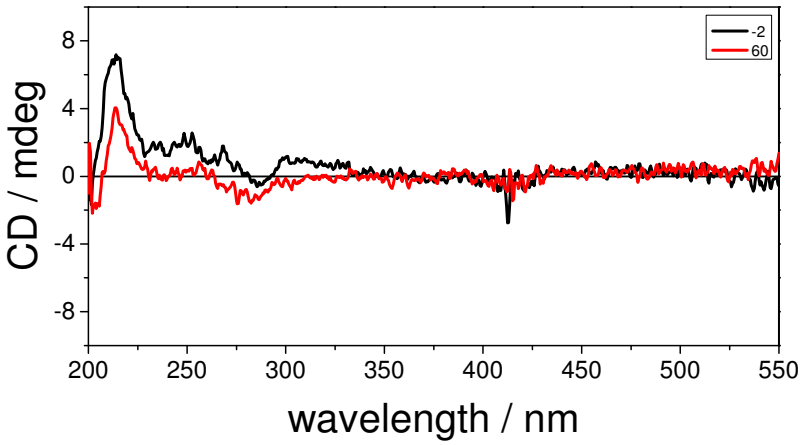

Figure S19: CD spectra of **2HPor-5'a-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

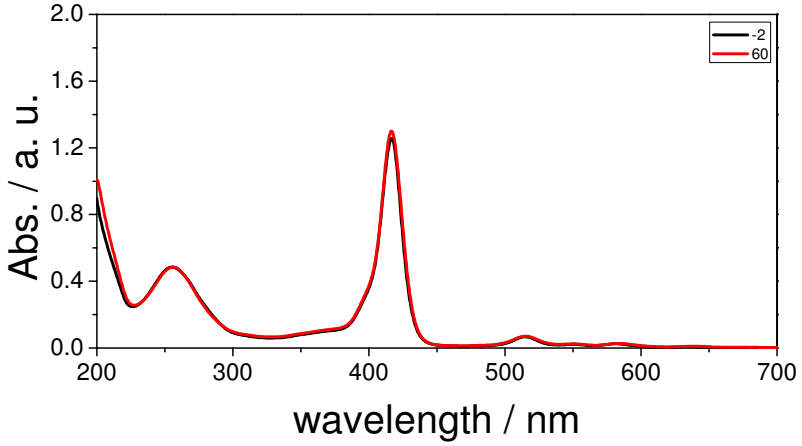

Figure S20: UV-vis absorption spectra of **2HPor-5'a-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

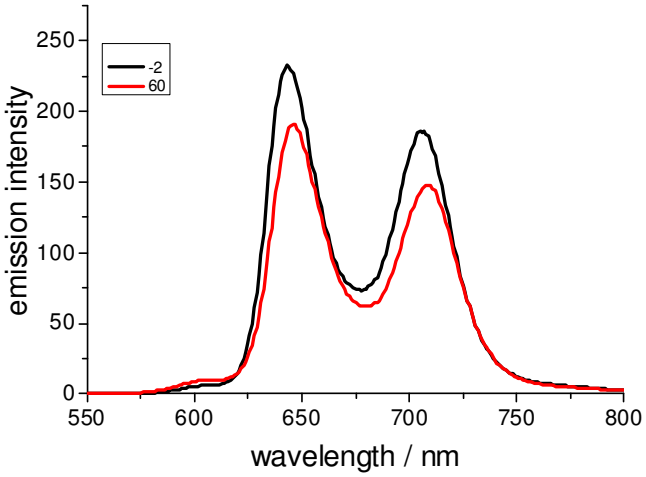

Figure S21: Fluorescence spectra of **2HPor-5'a-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

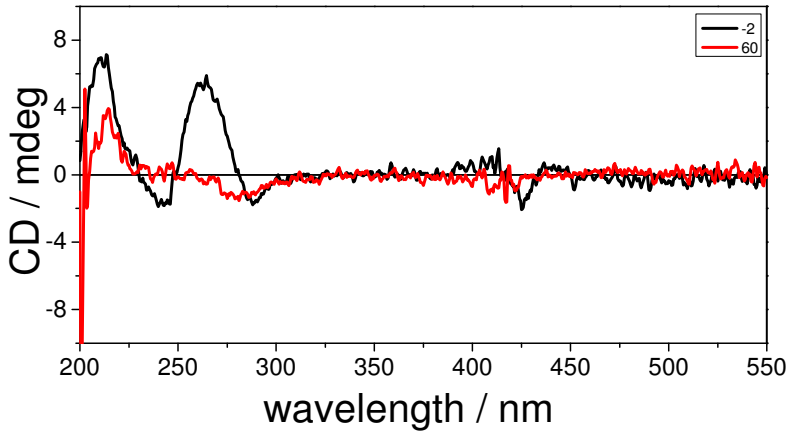

Figure S22: CD spectra of **2HPor-5'a-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

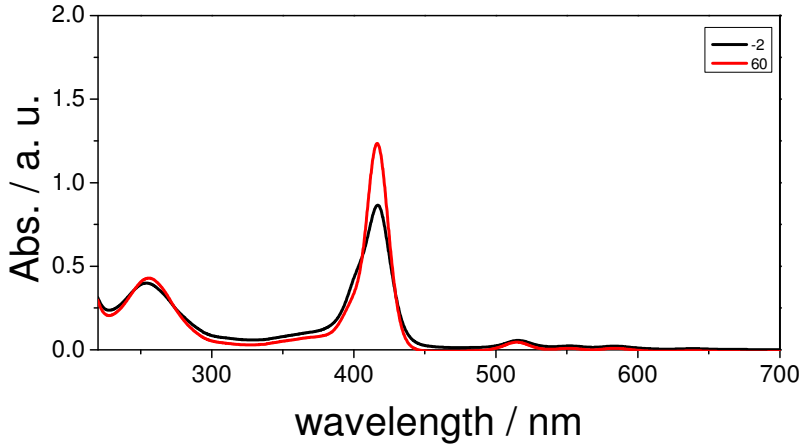

Figure S23: UV-vis absorption spectra of **2HPor-5'a-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

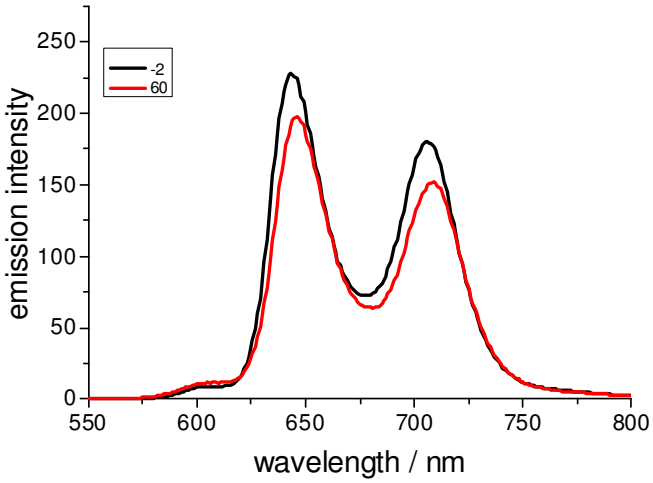

Figure S24: Fluorescence spectra of **2HPor-5'a-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

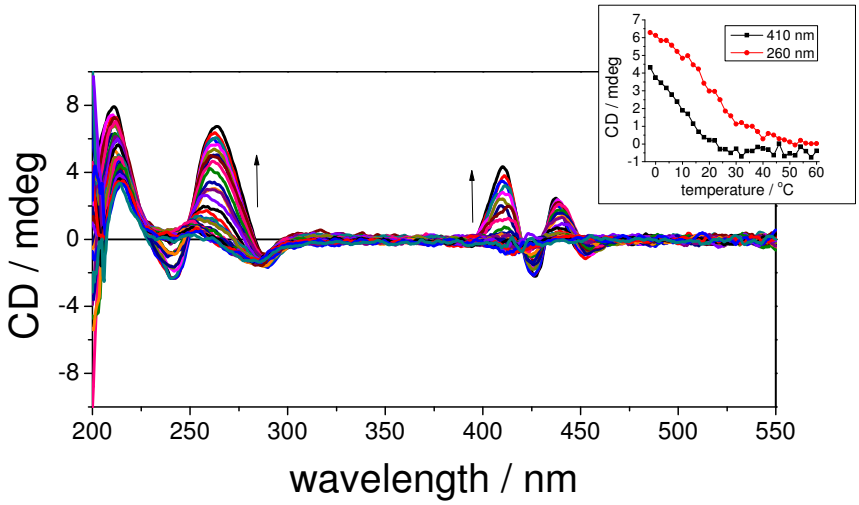

Figure S25: CD spectra of **2HPor-5'a-(dAdG)$_4$** in the presence of 100 mM NaCl. The sample was cooled from 60 ℃ to -2 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

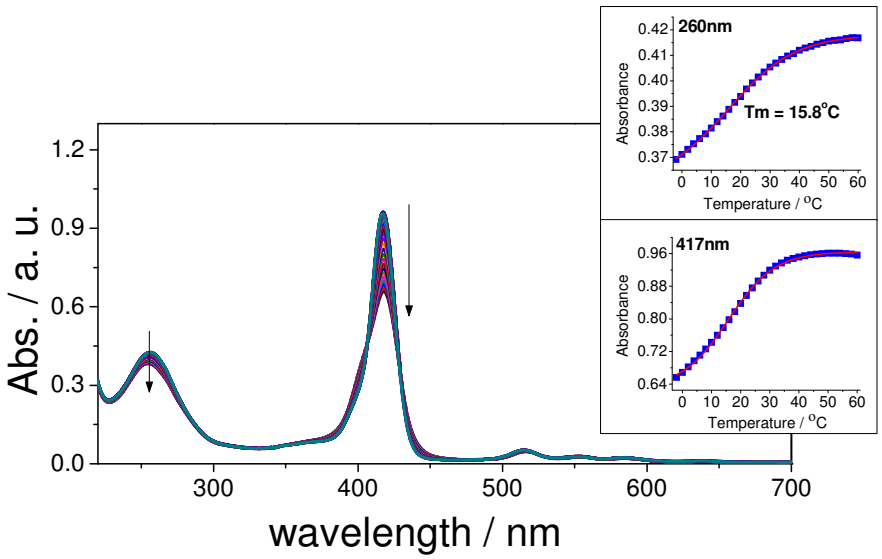

Figure S26: Variable-temperature UV-vis absorption spectra of **2HPor-5'a-(dAdG)$_4$** in the presence of 100 mM NaCl. The sample was cooled from 60 ℃ to -2 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

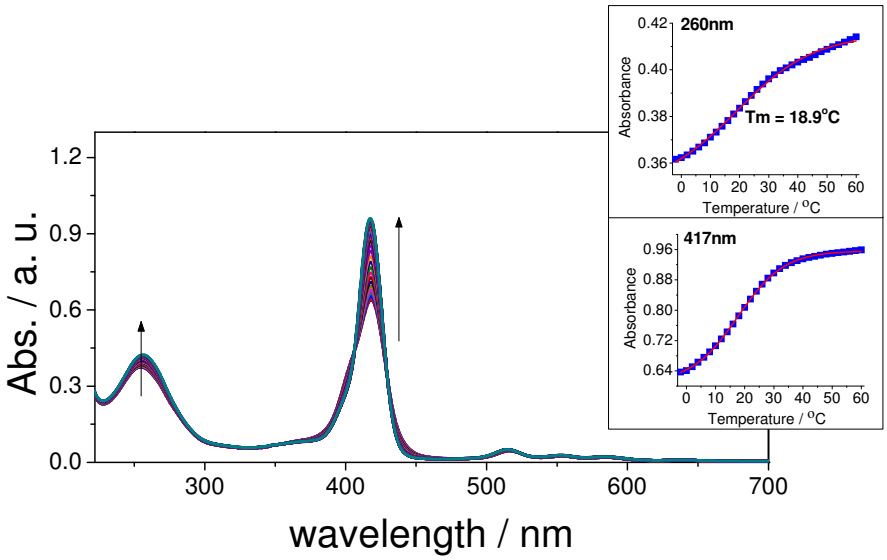

Figure S27: Variable-temperature UV-vis absorption spectra of **2HPor-5'a-(dAdG)$_4$** in the presence of 100 mM NaCl. The sample was heated from -2 ℃ to 60 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

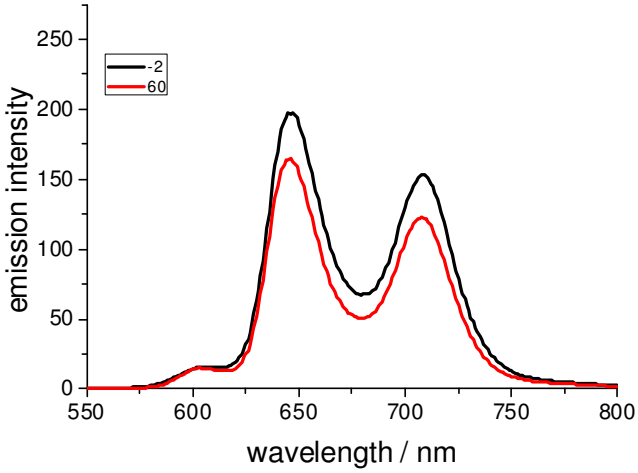

Figure S28: Fluorescence spectra of **2HPor-5'a-(dAdG)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

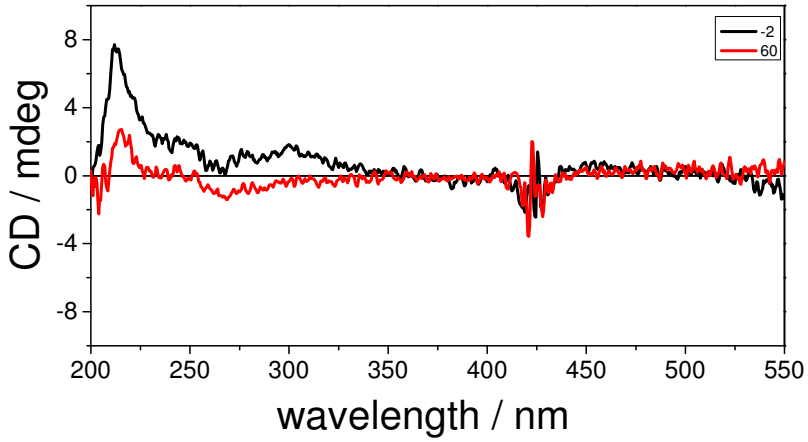

Figure S29: CD spectra of **ZnPor-5'a-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

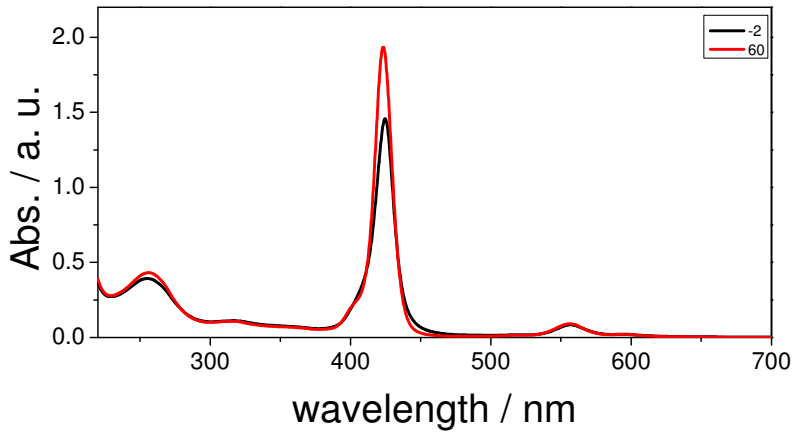

Figure S30: UV-vis absorption spectra of **ZnPor-5'a-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

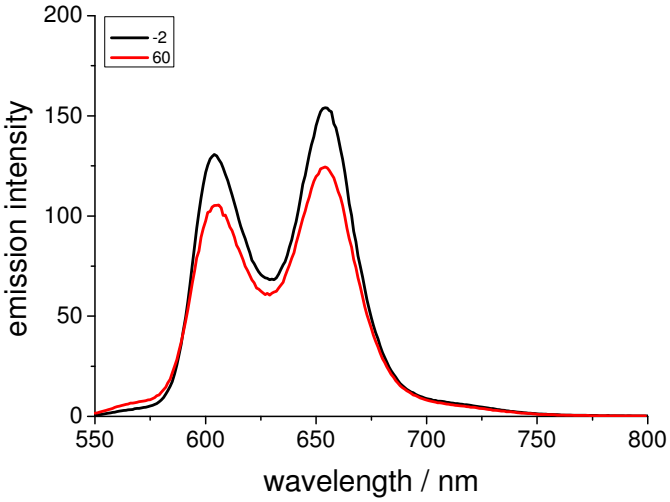

Figure S31: Fluorescence spectra of **ZnPor-5'a-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

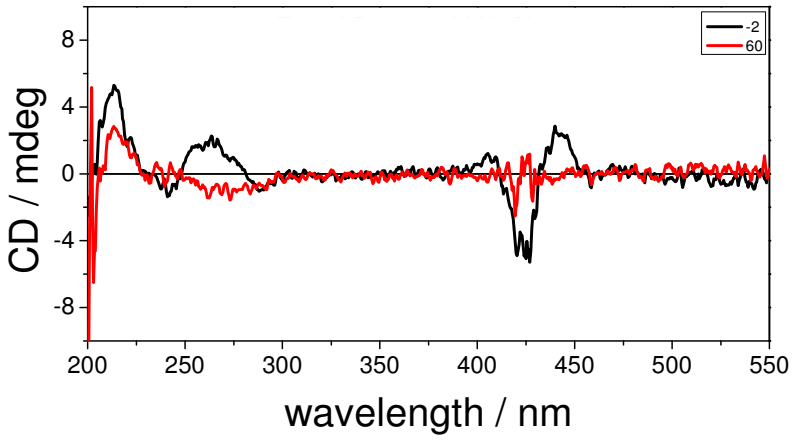

Figure S32: CD spectra of **ZnPor-5'a-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

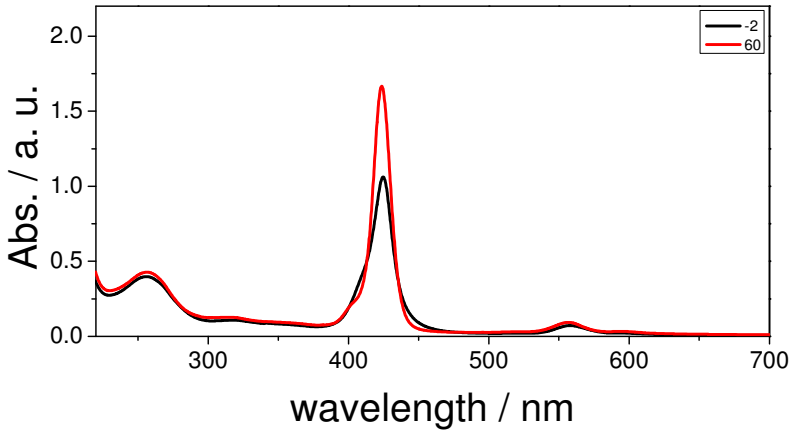

Figure S33: UV-vis absorption spectra of **ZnPor-5'a-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

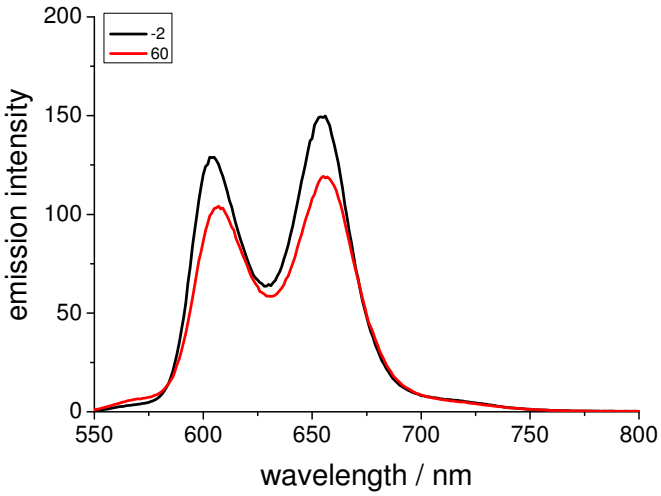

Figure S34: Fluorescence spectra of **ZnPor-5'a-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

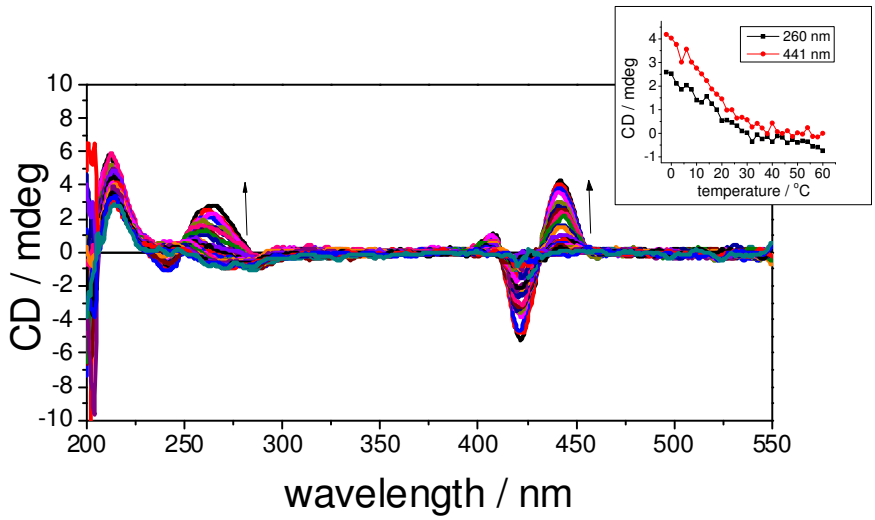

Figure S35: CD spectra of **ZnPor-5'a-(dAdG)$_4$** in the presence of 100 mM NaCl. The sample was cooled from 60 ℃ to -2 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

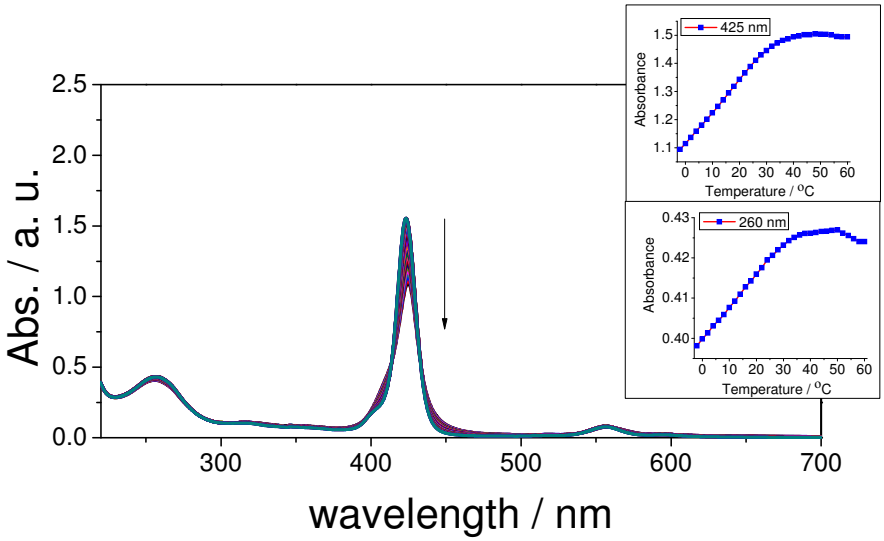

Figure S36: Variable-temperature UV-vis absorption spectra of **ZnPor-5'a-(dAdG)$_4$** in the presence of 100 mM NaCl. The sample was cooled from 60 ℃ to -2 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

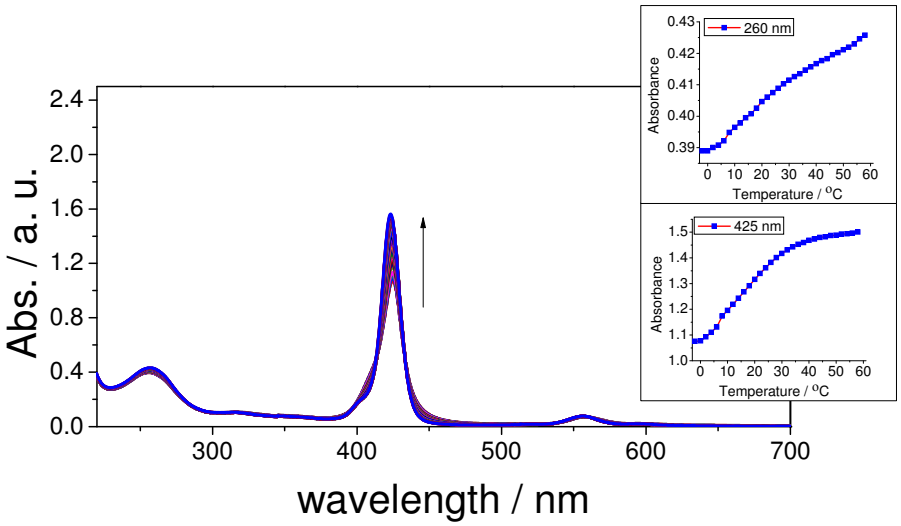

Figure S37: Variable-temperature UV-vis absorption spectra of **ZnPor-5'a-(dAdG)$_4$** in the presence of 100 mM NaCl. The sample was heated from -2 ℃ to 60 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

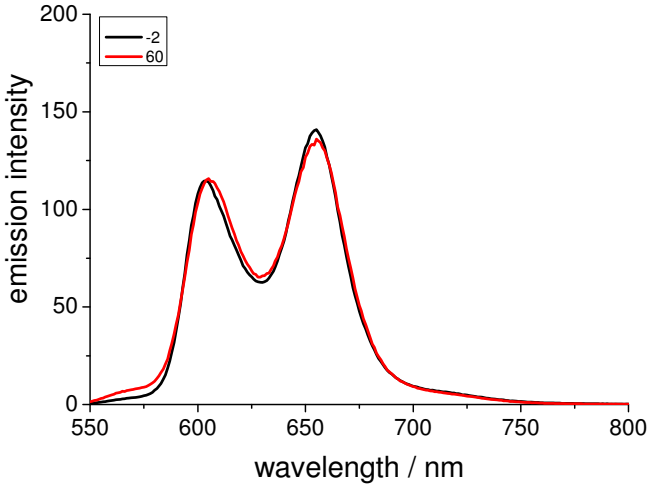

Figure S38: Fluorescence spectra of **ZnPor-5'a-(dAdG)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

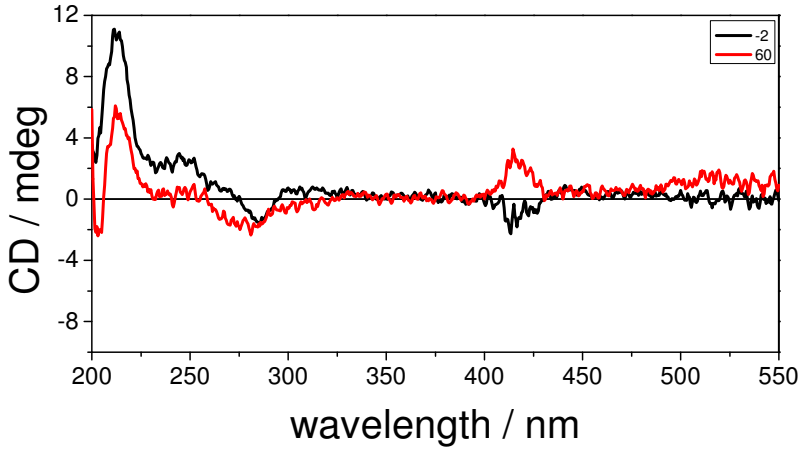

Figure S39: CD spectra of **2HPor-5'p-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

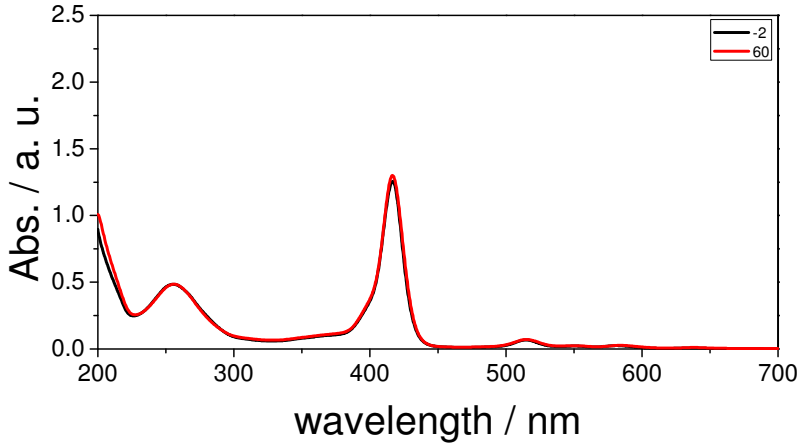

Figure S40: UV-vis absorption spectra of **2HPor-5'p-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

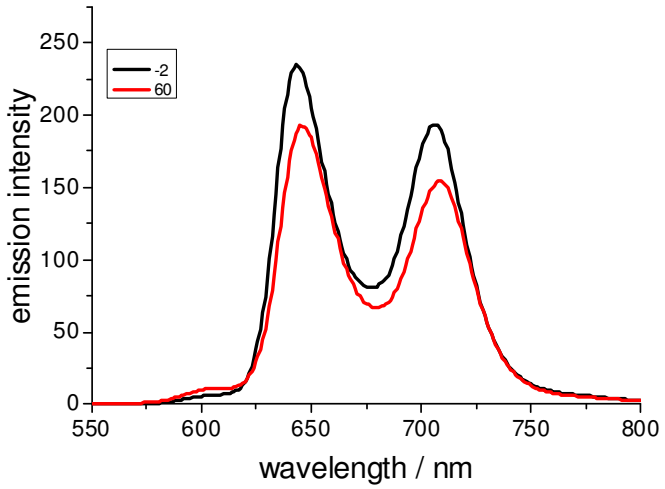

Figure S41: Fluorescence spectra of **2HPor-5'p-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

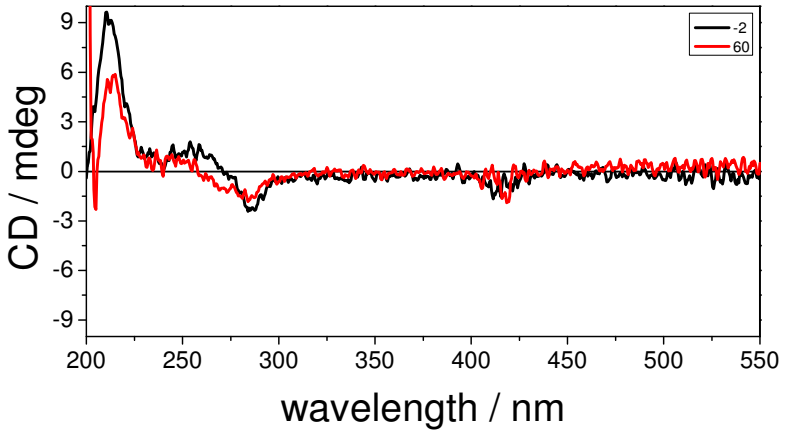

Figure S42: CD spectra of **2HPor-5'p-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

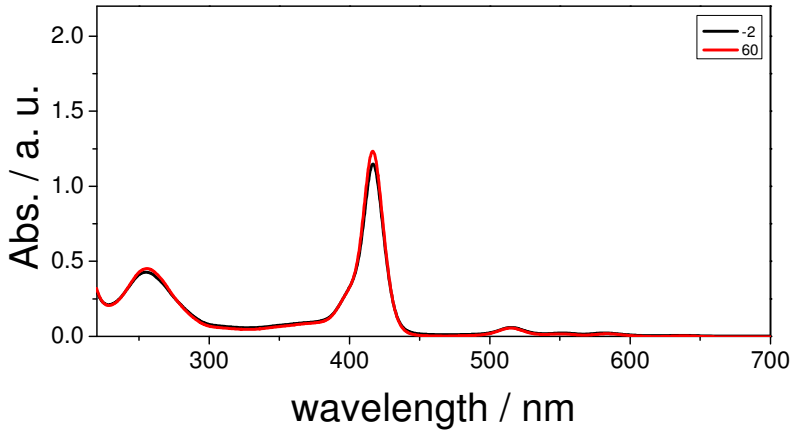

Figure S43: UV-vis absorption spectra of **2HPor-5'p-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

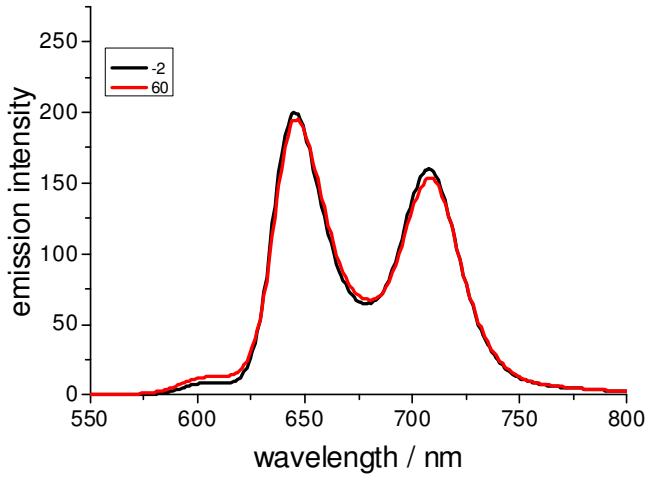

Figure S44: Fluorescence spectra of **2HPor-5'p-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

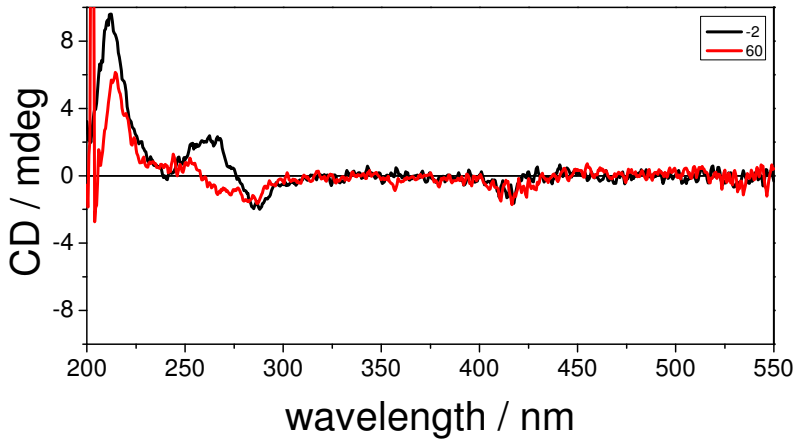

Figure S45: CD spectra of **2HPor-5'p-(dAdG)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

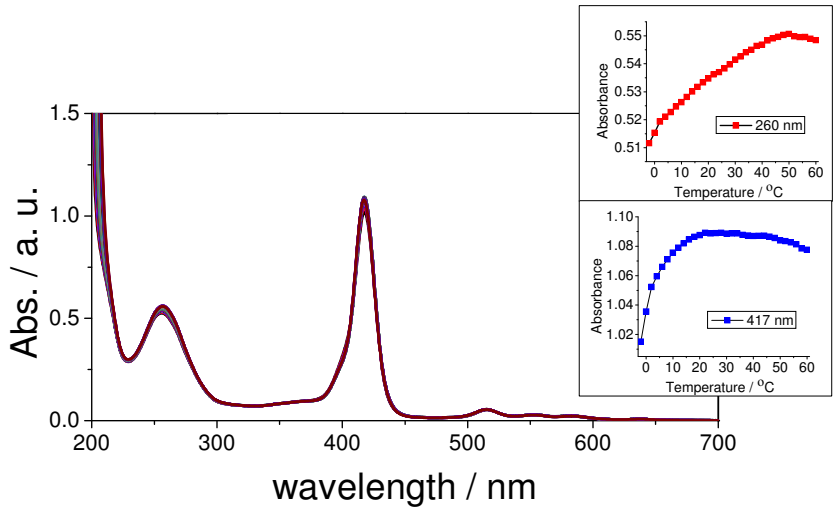

Figure S46: Variable-temperature UV-vis absorption spectra of **2HPor-5'p-(dAdG)$_4$** in the presence of 100 mM NaCl. The sample was cooled from 60 ℃ to -2 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

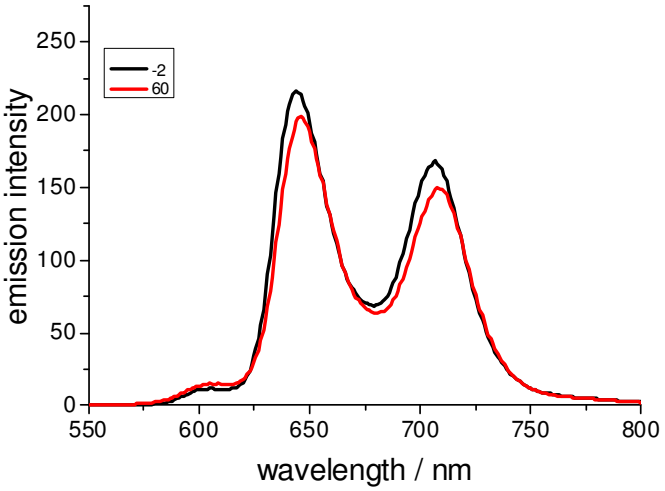

Figure S47: Fluorescence spectra of **2HPor-5'p-(dAdG)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

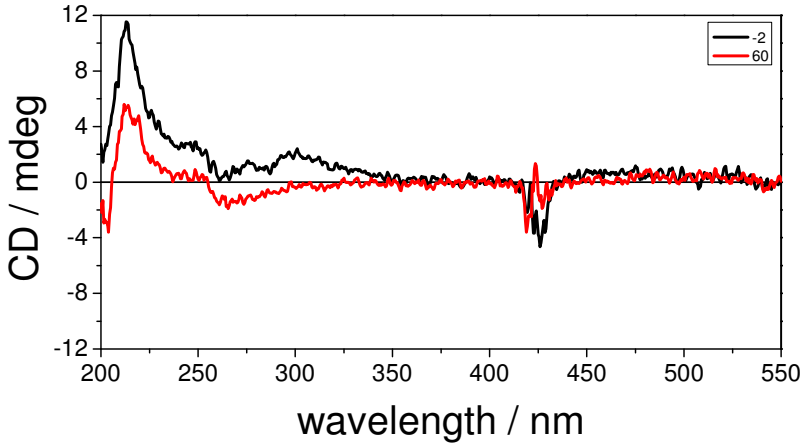

Figure S48: CD spectra of **ZnPor-5'p-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

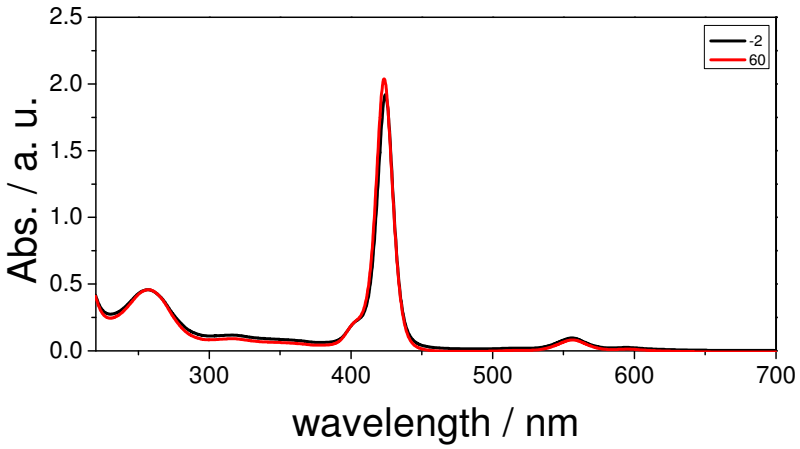

Figure S49: UV-vis absorption spectra of **ZnPor-5'p-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

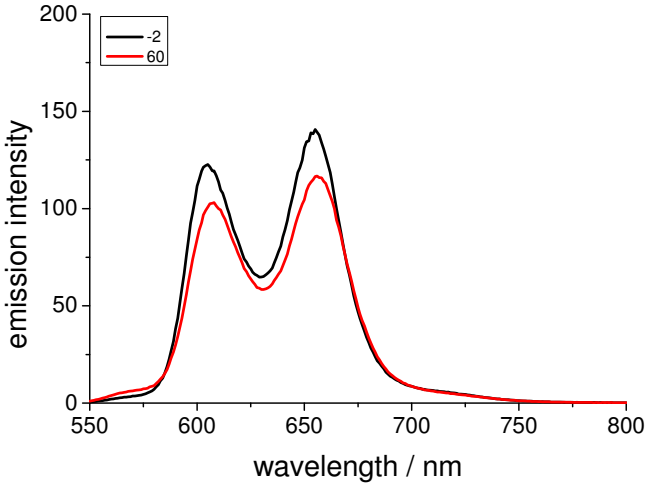

Figure S50: Fluorescence spectra of **ZnPor-5'p-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

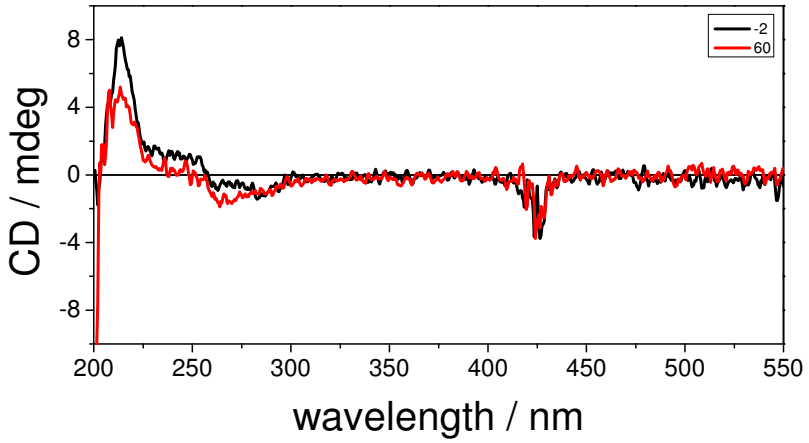

Figure S51: CD spectra of **ZnPor-5'p-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

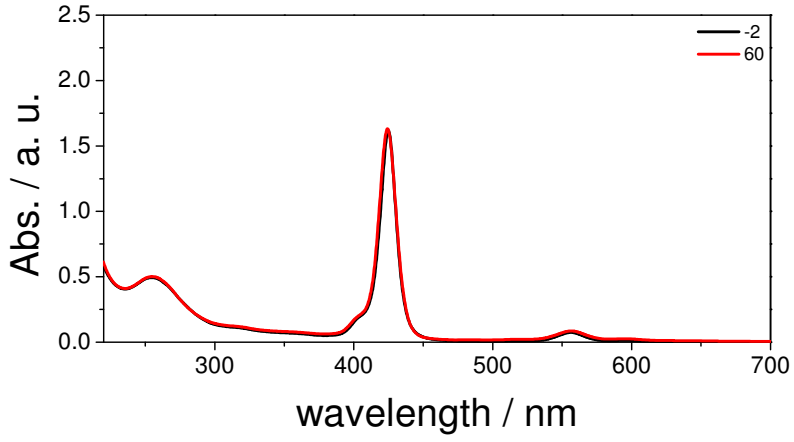

Figure S52: UV-vis absorption spectra of **ZnPor-5'p-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

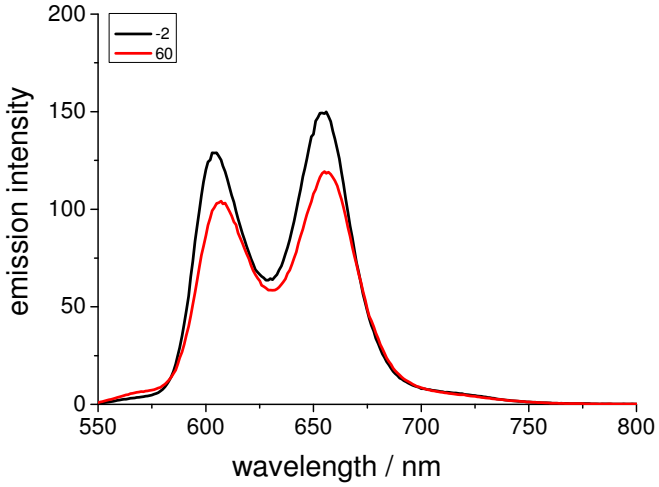

Figure S53: Fluorescence spectra of **ZnPor-5'p-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

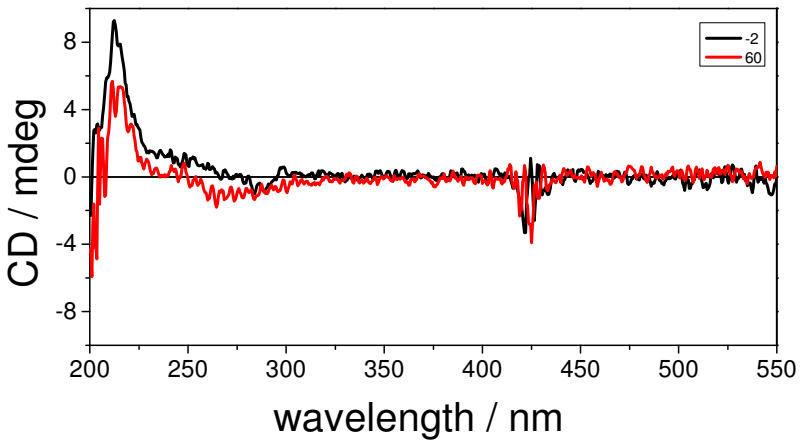

Figure S54: CD spectra of **ZnPor-5'p-(dAdG)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

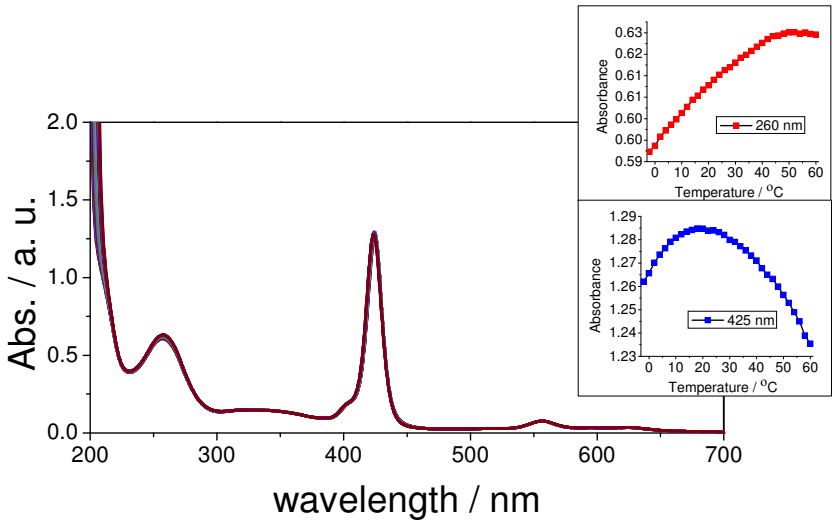

Figure S55: Variable-temperature UV-vis absorption spectra of **ZnPor-5'p-(dAdG)$_4$** in the presence of 100 mM NaCl. The sample was cooled from 60 ℃ to -2 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

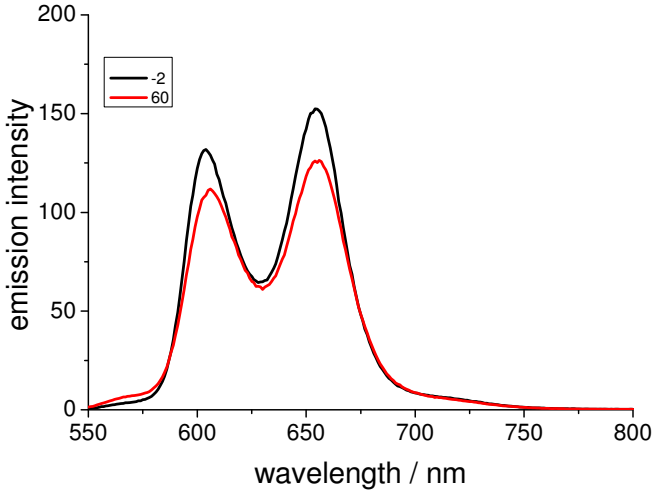

Figure S56: Fluorescence spectra of **ZnPor-5'p-(dAdG)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

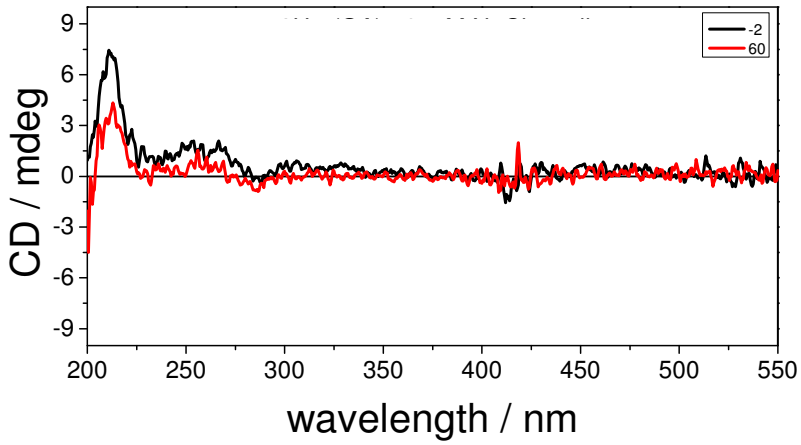

Figure S57: CD spectra of **2HPor-5'p-(dGdA)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

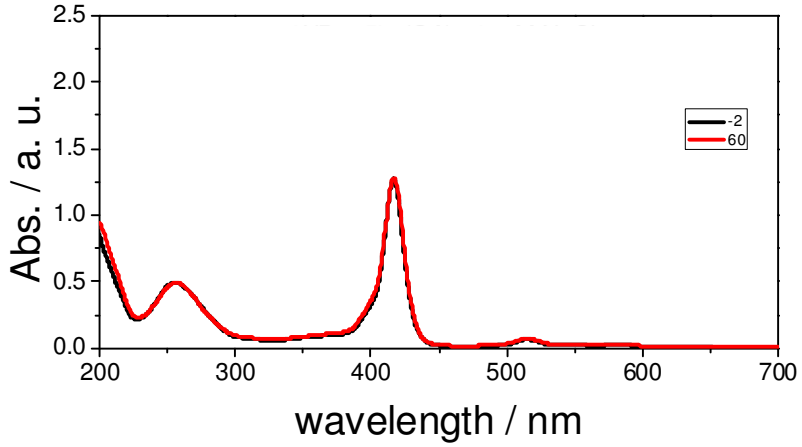

Figure S58: UV-vis absorption spectra of **2HPor-5'p-(dGdA)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

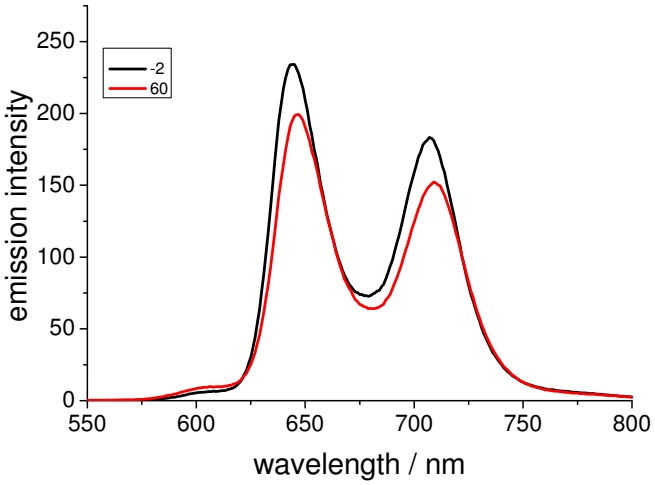

Figure S59: Fluorescence spectra of **2HPor-5'p-(dGdA)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

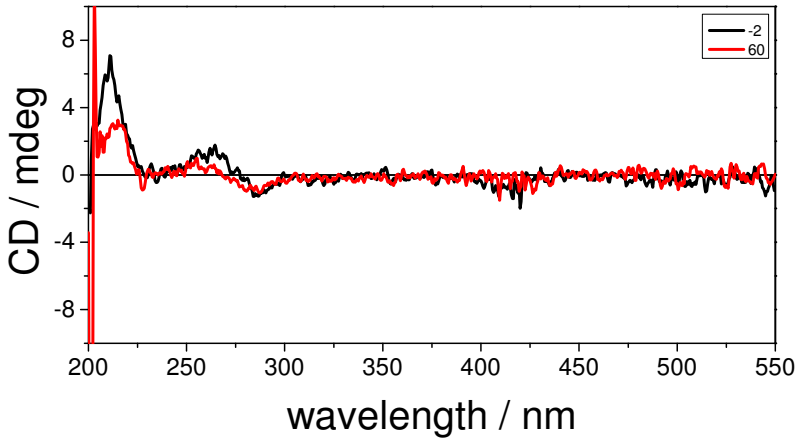

Figure S60: CD spectra of **2HPor-5'p-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

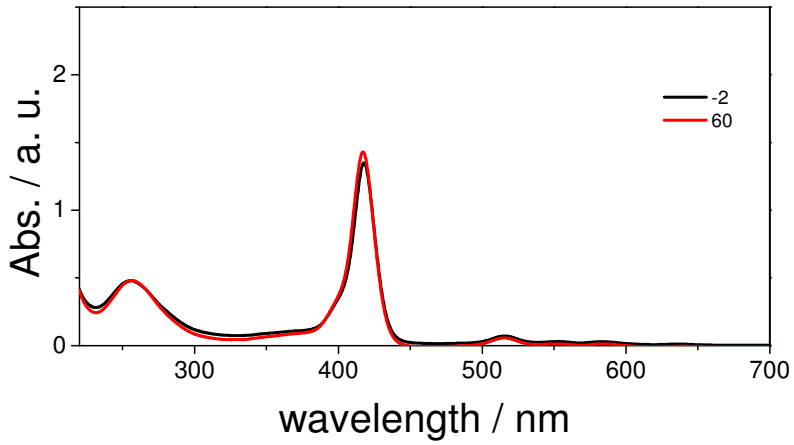

Figure S61: UV-vis absorption spectra of **2HPor-5'p-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

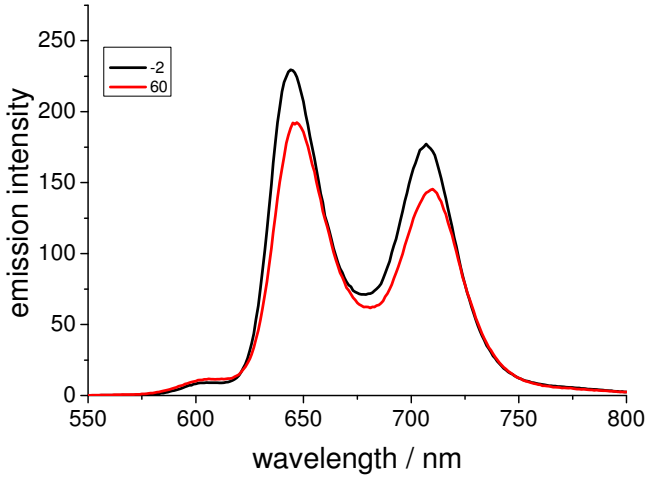

Figure S62: Fluorescence spectra of **2HPor-5'p-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

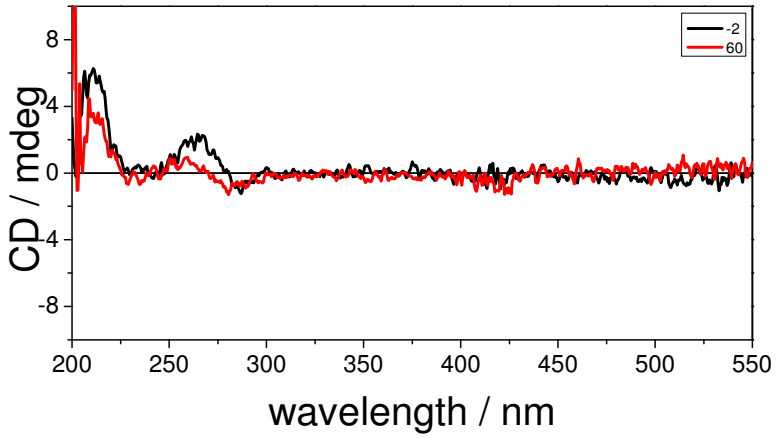

Figure S63: CD spectra of **2HPor-5'p-(dGdA)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

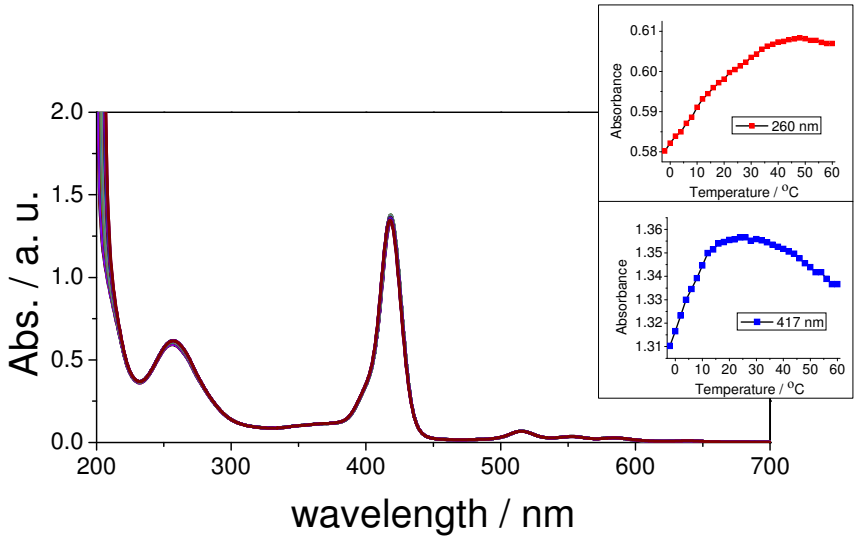

Figure S64: Variable-temperature UV-vis absorption spectra of **2HPor-5'p-(dGdA)$_4$** in the presence of 100 mM NaCl. The sample was cooled from 60 ℃ to -2 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

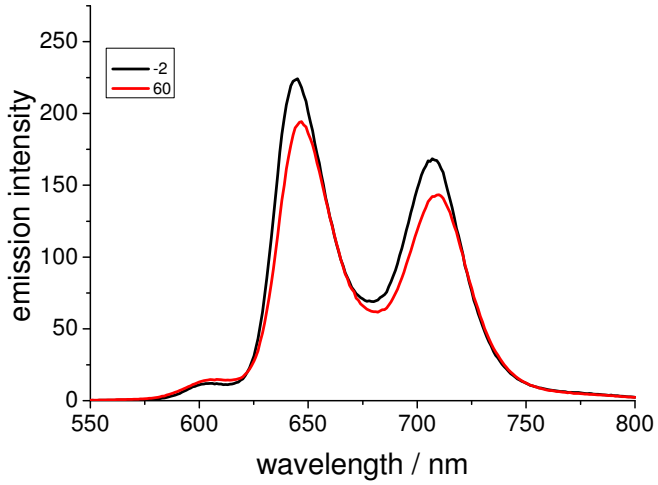

Figure S65: Fluorescence spectra of **2HPor-5'p-(dGdA)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

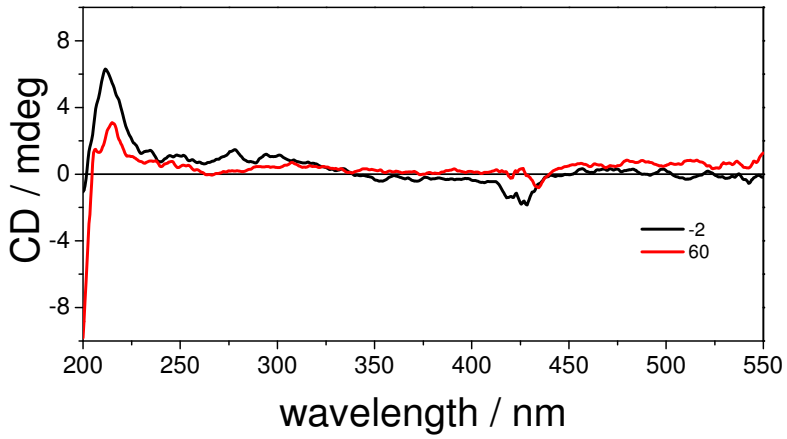

Figure S66: CD spectra of **ZnPor-5'p-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

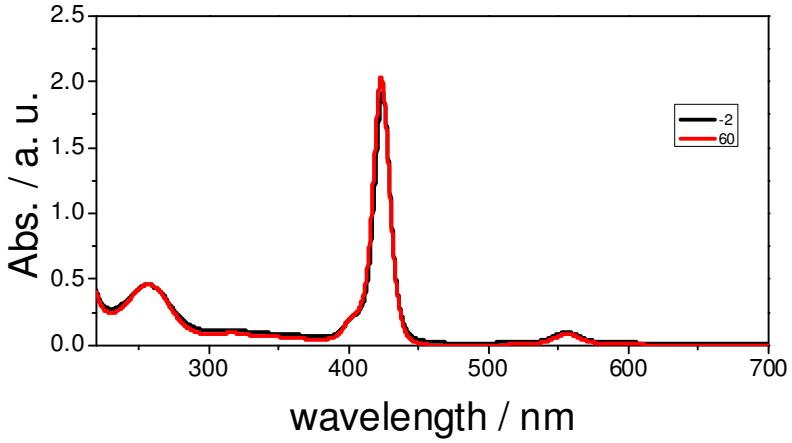

Figure S67: UV-vis absorption spectra of **ZnPor-5'p-(dGdA)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

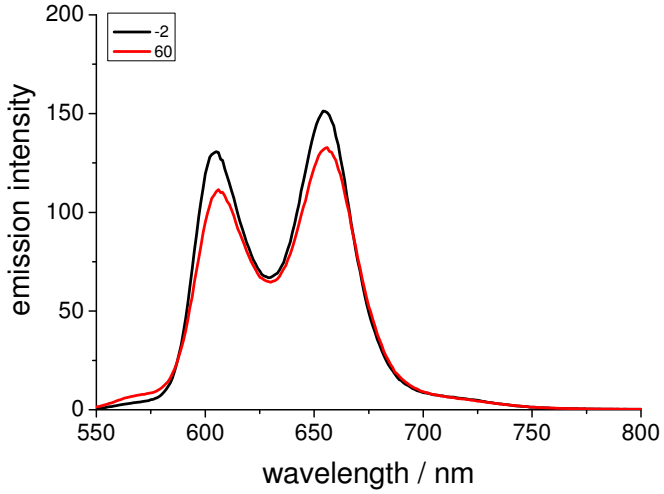

Figure S68: Fluorescence spectra of **ZnPor-5'p-(dGdA)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

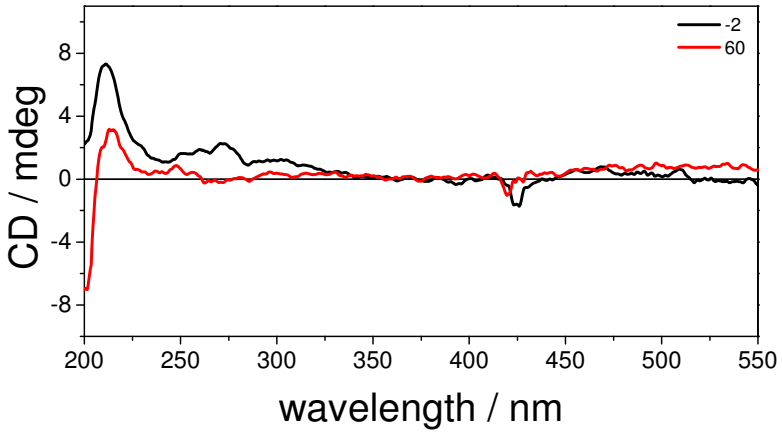

Figure S69: CD spectra of **ZnPor-5'p-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

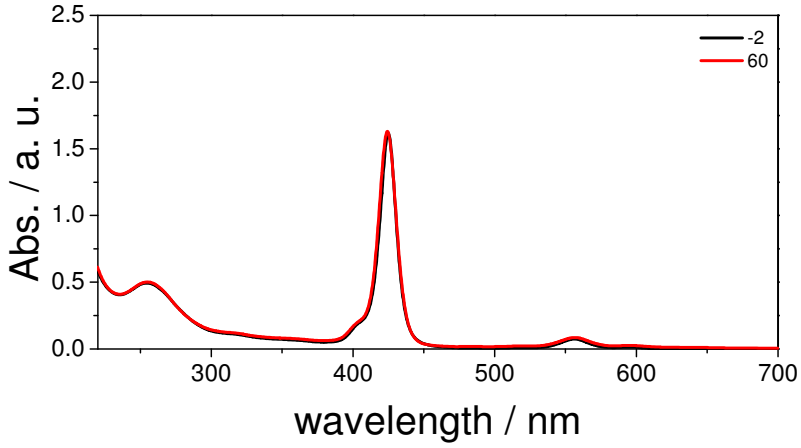

Figure S70: UV-vis absorption spectra of **ZnPor-5'p-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

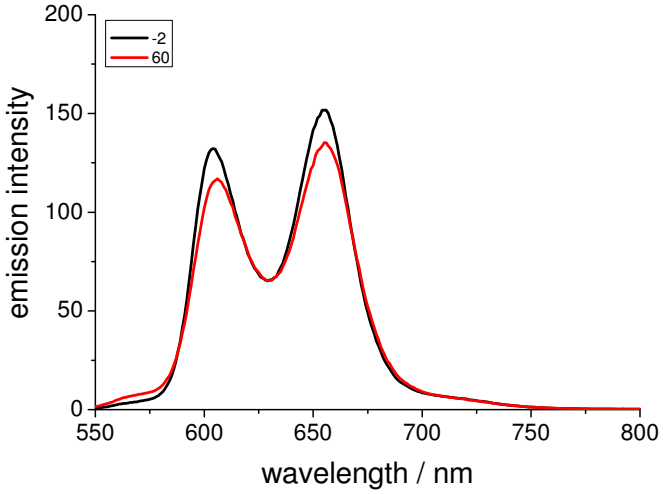

Figure S71: Fluorescence spectra of **ZnPor-5'p-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

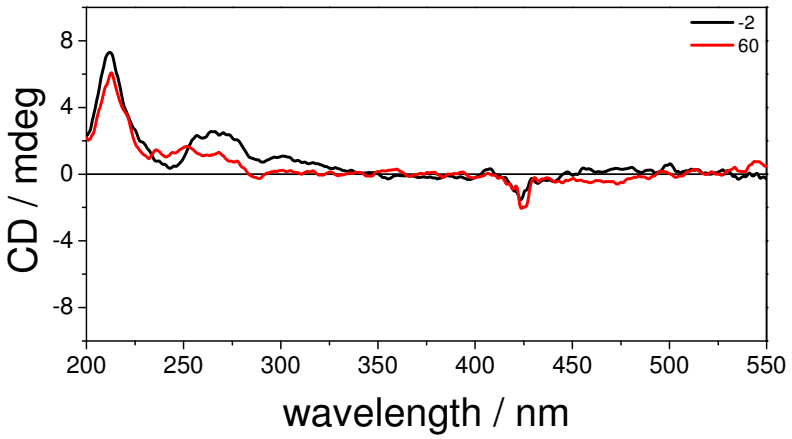

Figure S72: CD spectra of **ZnPor-5'p-(dGdA)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

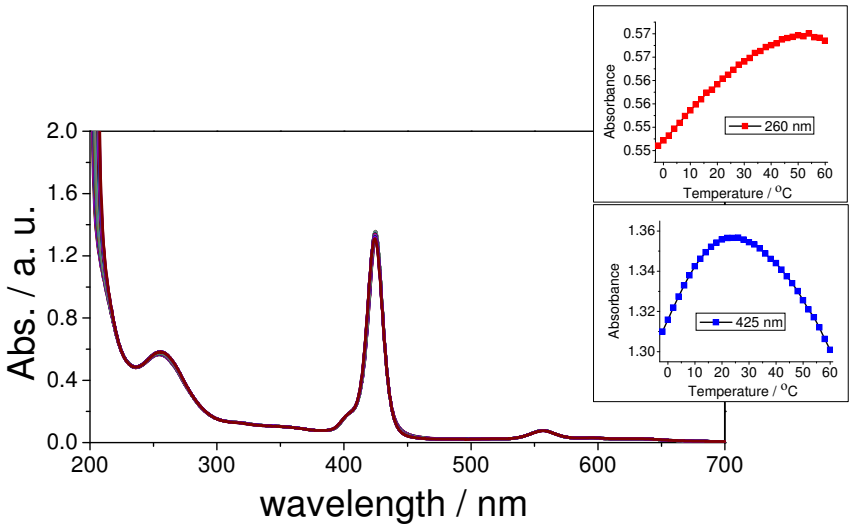

Figure S73: Variable-temperature UV-vis absorption spectra of **ZnPor-5'p-(dGdA)$_4$** in the presence of 100 mM NaCl. The sample was cooled from 60 ℃ to -2 ℃ at 1 ℃/min. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

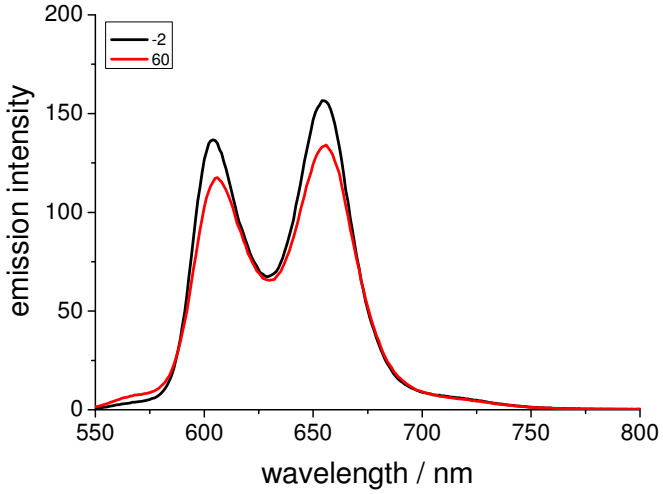

Figure S74: Fluorescence spectra of **ZnPor-5'p-(dGdA)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

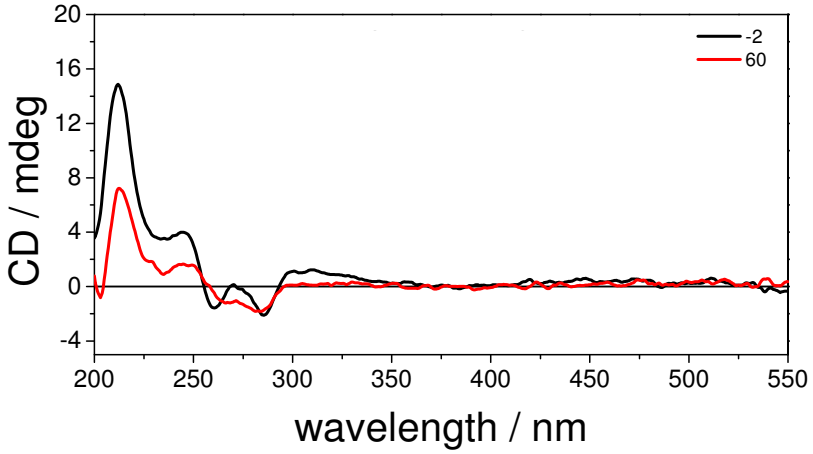

Figure S75: CD spectra of **5'-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

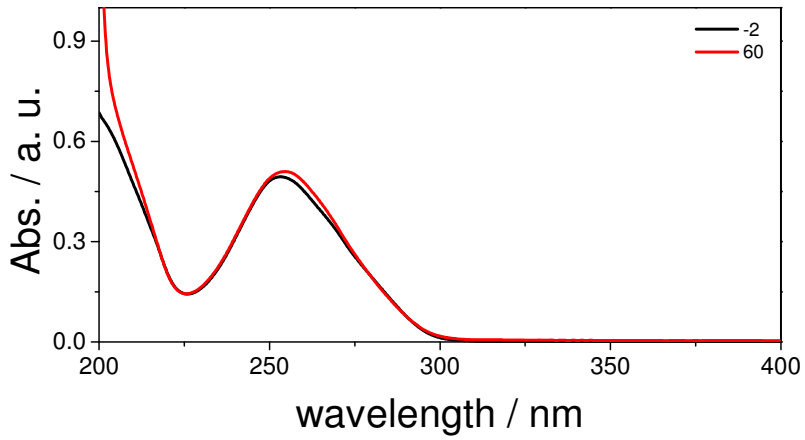

Figure S76: UV-vis absorption spectra of **5'-(dAdG)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

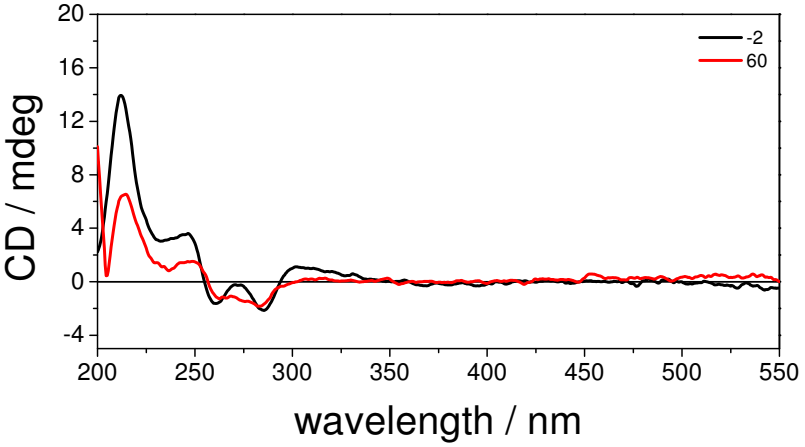

Figure S77: CD spectra of **5'-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

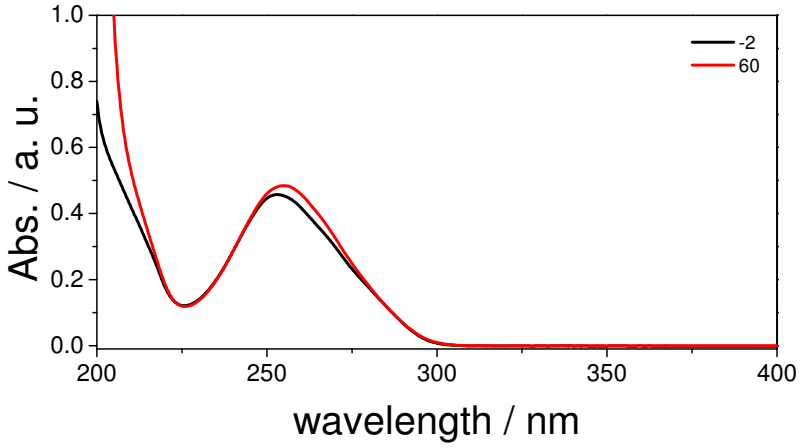

Figure S78: UV-vis absorption spectra of **5'-(dAdG)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

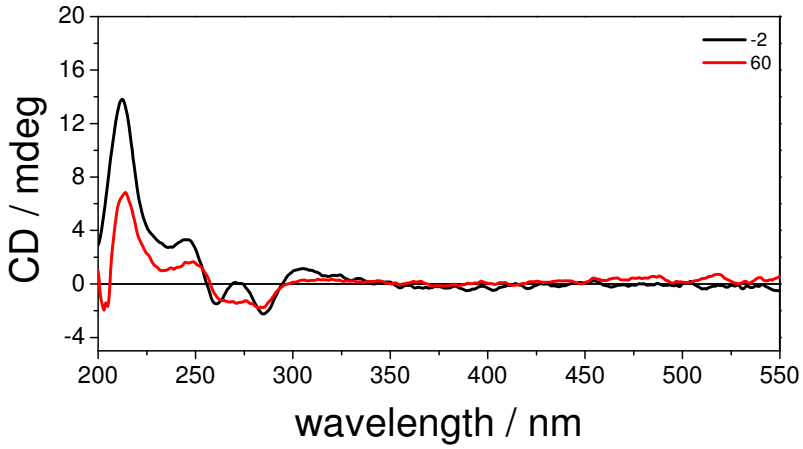

Figure S79: CD spectra of **5'-(dAdG)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

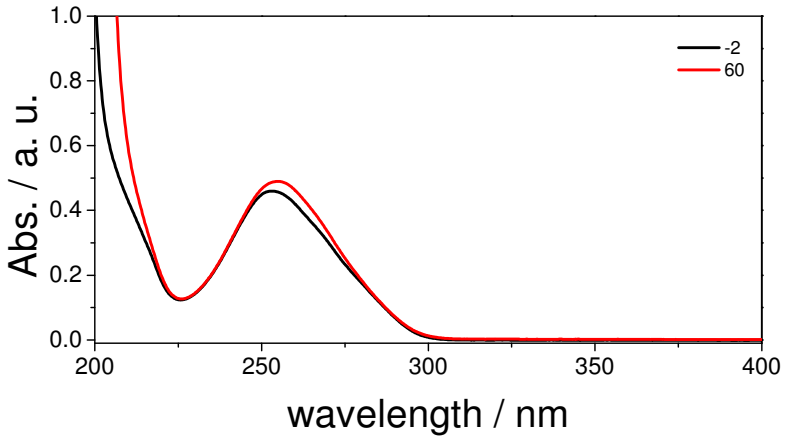

Figure S80: UV-vis absorption spectra of **5'-(dAdG)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

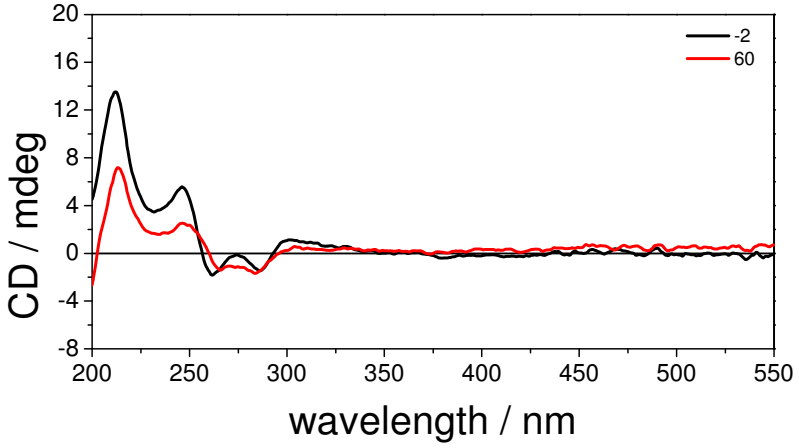

Figure S81: CD spectra of **5'-(dGdA)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

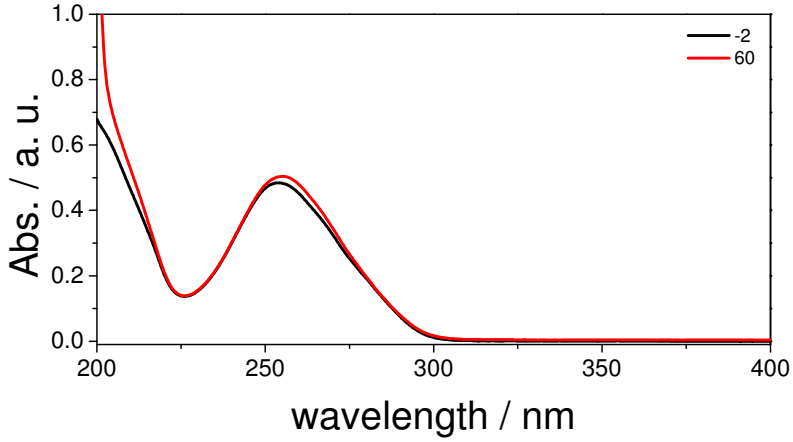

Figure S82: UV-vis absorption spectra of **5'-(dGdA)$_4$** in the absence of NaCl at -2 ℃ and 60 ℃. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

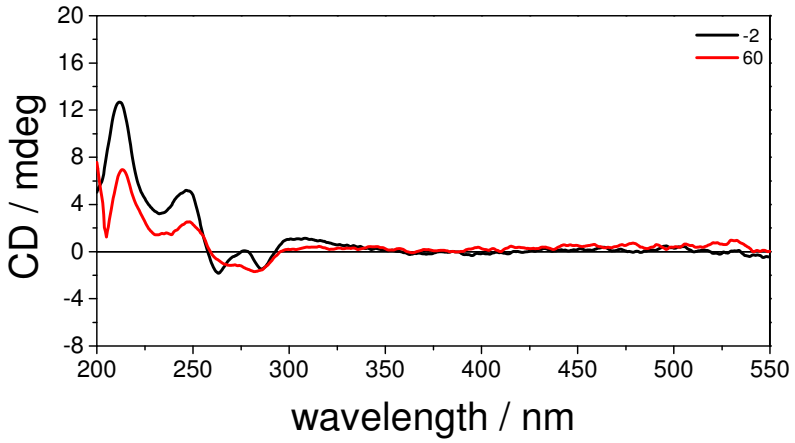

Figure S83: CD spectra of **5'-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

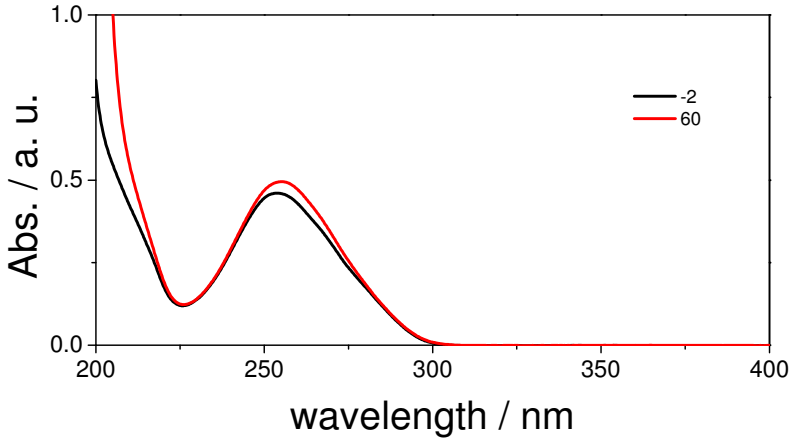

Figure S84: UV-vis absorption spectra of **5'-(dGdA)$_4$** in the presence of 40 mM NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

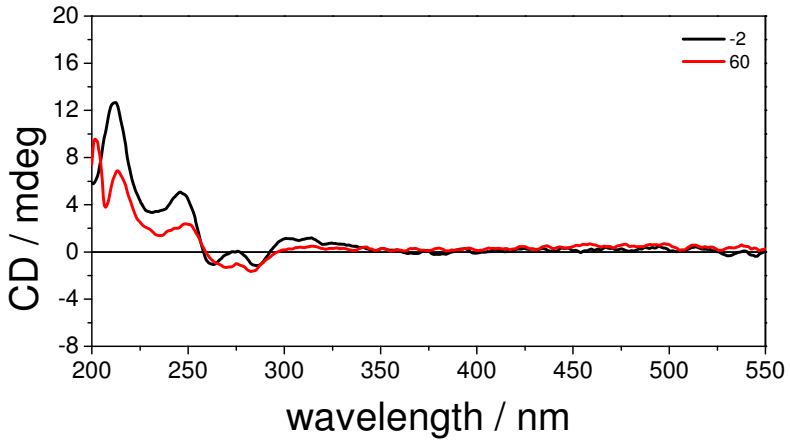

Figure S85: CD spectra of **5'-(dGdA)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

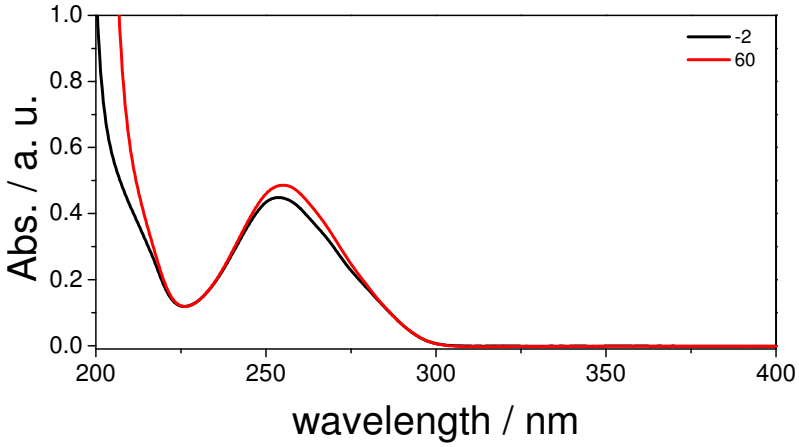

Figure S86: UV-vis absorption spectra of **5'-(dGdA)$_4$** in the presence of 100 mM NaCl at -2 ℃ and 60 ℃. Conditions: [DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

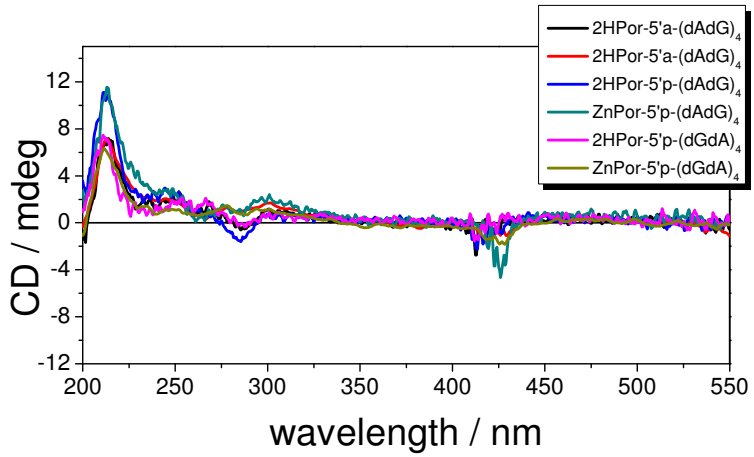

Figure S87: CD spectra of six synthesized Por-DNA conjugates in the absence of NaCl at -2 ℃. Conditions: [Por-DNA] = 5.0 μM, Na-cacodylate buffer (1 mM, pH = 7.0).

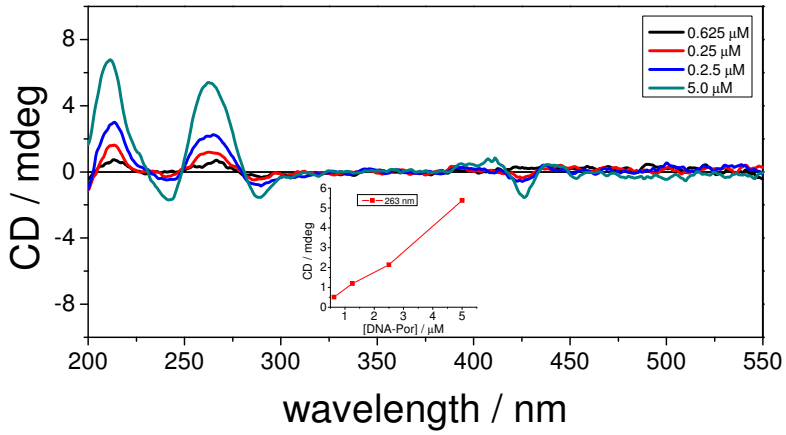

Figure S88: CD spectra of **2HPor-5'a-(dAdG)$_4$** at different concentrations in the presence of 40 mM NaCl at -2. The sample was diluted by adding a solution of Na-cacodylate buffer (1 mM, pH = 7.0) with NaCl (40 mM) at -2 ℃.

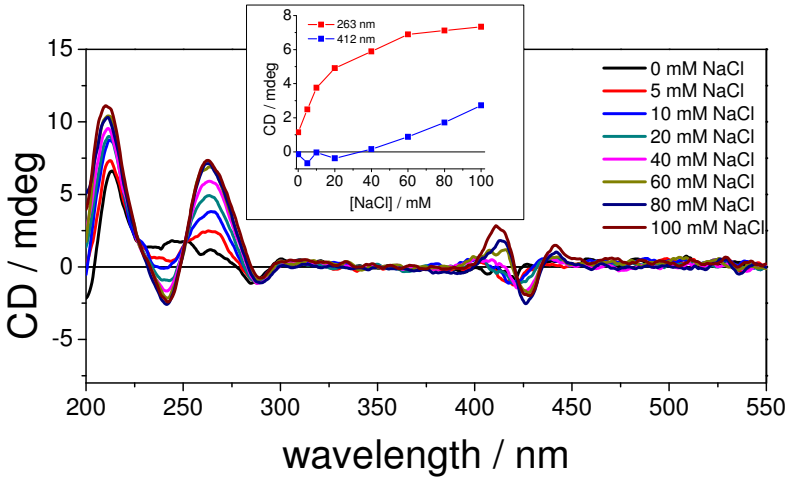

Figure S89: CD spectra of **2HPor-5'a-$(dAdG)_4$** (5.0 µM) at different NaCl concentration. The NaCl concentration was increased to 80 mM by addition of a stock solution (4 M). 100 mM concentration was achieved by addind solid salt. Conditions: [Por-DNA] = 5.0 µM, Na-cacodylate buffer (1 mM, pH = 7.0).

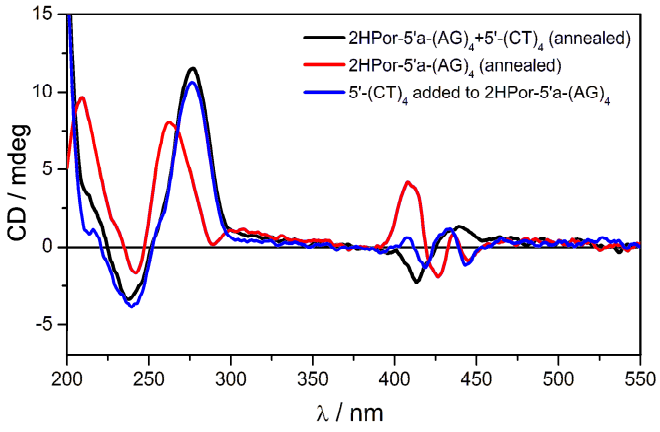

Figure S90: CD spectra of neat **2HPor-5'a-$(AG)_4$** annealed from 60 ℃ to -2 ℃ (red curve); annealed from 60 ℃ to -2 ℃ with equimolar amount of 5'-$(CT)_4$ (black curve); and after addition of equimolar amount of 5'-$(CT)_4$ to pre-annealed **2HPor-5'a-$(AG)_4$** at -2 ℃ (blue curve). Conditions: [Por-ODN] = 5.0 µM, 100 mM NaCl, Na-cacodylate buffer (1 mM, pH = 7.0).

Figure S91: PAGE of **2HPor-5'a-(dAdG)$_4$** and **2HPor-5'p-(dAdG)$_4$**. Gel was run in Na-cacodylate buffer (1 mM, pH = 7.0) with 40 mM NaCl for 8 h at 30 mA at 0 °C. Ultraviolet lamp (λ = 365 nm) was used to visualize porphyrin-DNA conjugates.