Detection of Double Stranded DNA by Intercalation of Ruthenium(II) Complex on Electrochemiluminescence

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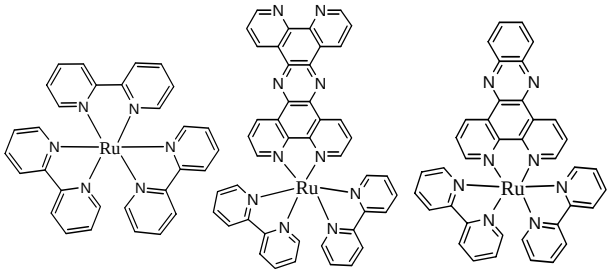
Various fluorescent ruthenium aromatic amine complexes (Fig. 1) have been known to bind to double stranded DNA(ds-DNA) and utilization of the property for DNA-chip technology has been attempted for a decade. Among various methods of detecting complexes bound specifically to ds-DNA, electrochemiluminescence (ECL) has attracted much attention as a technique that affords low price and high-speed detection method. However, the ruthenium complexes employed previously have various disadvantages as probes for ECL because of insufficient sensitivity or specificity for ds-DNA, resulting large background intensity.

The groove binder **1** does not show particular change in the ECL intensity on addition of ds-DNA or single stranded DNA(ss-DNA). To overcome these problems, we have surveyed various ruthenium complexes and found that ECL emission intensity of **2** increases drastically with ds-DNA at the mole ratio [DNA base-pair]/[**2**] = 5.0, exhibiting "molecular light switch" function on ECL. Addition of ss-DNA also increased the ECL intensity but to the lesser extent. The complex **3** showed similar property, but the ECL intensity was much smaller than that observed for **2**. A similar "molecular light switch" effect of **2** was also confirmed on DNA-fixed electrodes, indicating the possibility of **2** for a probe for DNA-chip.



1 **2** **3**

Fig. 1 Structure of cation part of **1**, **2** and **3**.

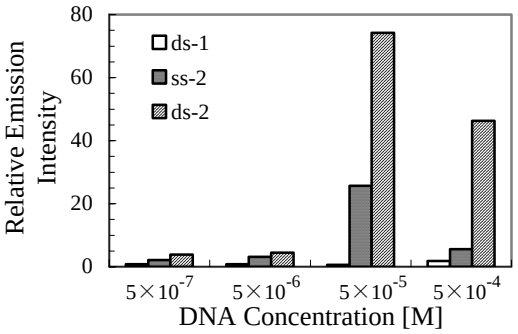


Fig. 2 Relative emission intensity for the titration of DNA to the rutheniumcomplex ([Ru] = 10^{-5} M).