

Site Selective Binding of Cationic Schiff Base Complexes of Nickel(II) with DNA

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Transition-metal complexes that interact specifically with DNA are the candidates for reagents of biotechnology and medicine. To design such novel complexes, one has to know the factors that govern not only the binding mode but also the specificity of DNA-base sequence recognition. It has been reported that cationic salen-type Schiff base metal complexes with square planar coordination structure bind to DNA by electrostatic and hydrophobic interactions and the binding affinity or cleaving reactivity for DNA is affected by the bridging group in the quadridentate Schiff bases ¹. In this study, we examined the sequence selectivity of nickel(II) complexes of the Schiff bases (Figure 1) by spectroscopic techniques.

UV-vis and CD measurements indicated that the complexes have similar binding constant (ca. 10^6 M^{-1}) for calf thymus DNA but different site-size numbers (20 for $[\text{NiMSen}]^{2+}$ and 8 for $[\text{NiMSph}]^{2+}$), indicating that the former binds more site-selectively to DNA than the later. To investigate the site selectivity of $[\text{NiMSen}]^{2+}$ more in detail, we measured ¹H-NMR spectra of $[\text{NiMSen}]^{2+}$ bound to several self-complementary dodecanucleotides. From intermolecular NOE cross-peaks and chemical shifts of the dodecanucleotides, it was revealed that $[\text{NiMSen}]^{2+}$ binds to AT rich region in the minor groove of DNA. Among these nucleotides, $[\text{NiMSen}]^{2+}$ recognized "AATT" sequence most specifically. The results of molecular dynamic calculations for these systems will also be presented.

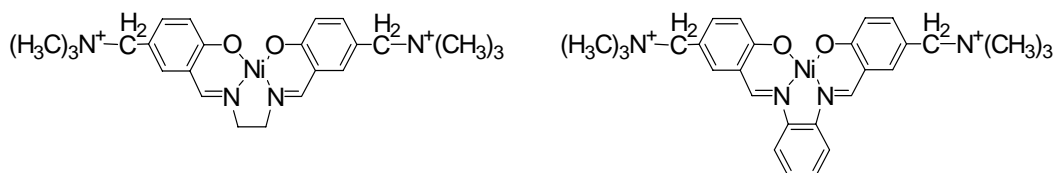


Figure 1. $[\text{Ni(MSen)}]^{2+}$ (left) and $[\text{Ni(MSph)}]^{2+}$ (right).

1) Y. Fujii *et al.*, *Bull. Chem. Soc. Jpn.*, 1997, 70, 615.