

Microsymposium

MS91.O06

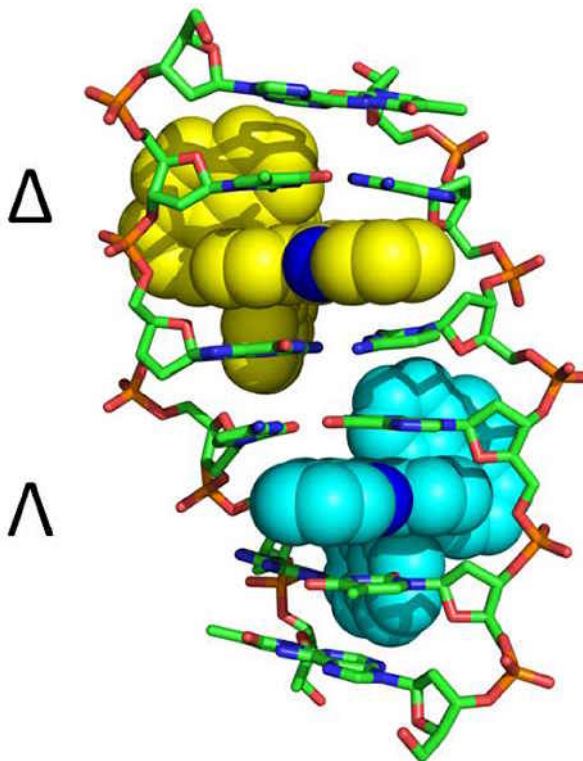
Structure and Dynamics of DNA-bound Ruthenium Complexes

J. Hall^{1,2}, K. O'Sullivan³, H. Niyazi¹, J. Sanchez-Weatherby², G. Winter², T. Sorensen², D. Cardin¹, S. Quinn⁴, J. Kelly³, C. Cardin¹

¹University of Reading, Department of Chemistry, Reading, UK, ²Diamond Light Source, Didcot, UK, ³Trinity College, Department of Chemistry, Dublin, Ireland, ⁴University College Dublin, UCD School of Chemistry and Chemical Biology, Dublin, Ireland

Since the 1980s, there has been great interest in how polypyridyl ruthenium complexes bind to DNA. This is due to their photoactive properties[1], which have great potential in photodynamic therapy, as they are able to damage DNA upon photoirradiation. However, there has been significant debate over the precise binding sites of these complexes due to the lack of definitive structural information. Presented here are several high resolution crystal structures showing how these complexes can bind to short DNA oligonucleotides. With each new structure we are able to answer questions about the binding geometry and step specificity which could explain the observations obtained from biophysical measurements in solution. We have shown that the complexes bind by intercalation as well as confirming a previously proposed binding mode, semi-intercalation. We have also shown that the complexes bind with a high level of sequence specificity[2], preferring TA steps over AT and CG and that each enantiomer can bind with a different orientation[3] (Figure 1). One obvious advantage to working with crystal samples is that they possess a well defined molecular structure, which can be determined and is therefore known. Spectroscopic experiments, with data collected in the picosecond and nanosecond timescale, will also be reported with these systems.

[1] C. G. Coates, P. Callaghan, J. J. McGarvey, et al. *Journal of Molecular Structure*, 2001, 598, 15-25., [2] H. Niyazi, J. P. Hall, K. O'Sullivan, et al. *Nature Chemistry*, 2012, 4, 621-628., [3] J. P. Hall, D. Cook, S. Ruiz Morte, et al. *Journal of the American Chemical Society*, 2013, 135, 12652-12659



Keywords: DNA, light-switch, photoactivatable