Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Threading moieties play a significant role in determining the DNA binding properties of binuclear ruthenium complexes THAYAPARAN PARAMANATHAN, Department of Physics, Bridgewater State University, Bridgewater, MA, ANDREW CLARK, Department of Physics, Northeastern University, Boston, MA, FREDRIK WESTERLUND, PER LINCOLN, Department of Chemical and Biological Engineering, Chalmers University of Technology, Gothenburg, MICAH J. MCCAULEY, Department of Physics, Northeastern University, Boston, MA, IOULIA ROUZINA, Department of Biochemistry, Molecular Biology and Biophysics, University of Minnesota, Minneapolis, MN, MARK C. WILLIAMS, Department of Physics, Northeastern University, Boston, MA — Binuclear ruthenium complexes are of interest due to their selective DNA binding properties, which make them potential candidates for chemotherapy. These dumbbell shaped molecules have to thread through the DNA base pairs to reach their final threaded intercalation state. Here we study the binuclear ruthenium complex, $\Delta\Delta$-[μ-bidppz$(bpy)_4Ru_2$]$^{4+}$ and compare it with the previously studied $\Delta\Delta$-[μ-bidppz$(phen)_4Ru_2$]$^{4+}$. Both have the same intercalating bridge unit, but different threading moieties. In this study, we stretch a single DNA molecule held with optical tweezers in the presence of the ligand at various concentrations and hold the DNA at constant force until an equilibrium DNA elongation is reached. The extension of the DNA obtained as a function of time during binding yields the kinetics and equilibrium binding properties of the ligand. The preliminary data suggests that the binuclear complex with bpy in the threading moiety shows stronger affinity and an order of magnitude faster on rate, compared to its counterpart with phen in the threading moiety. This confirms the hypothesis that the extra aromatic ring of phen interferes with the threading intercalation process.

Thayaparan Paramanathan
Department of Physics, Bridgewater State University, Bridgewater, MA

Date submitted: 14 Nov 2014 Electronic form version 1.4