

## **Photophysics and Photochemistry in DNA: How little we know, How much to discover**

Roberto Improta

*Istituto Biostrutture e BioImmagini-CNR, Via Mezzocannone16, 80134, Napoli, Italy*

By discussing some of the results obtained in the theoretical study of the excited state behavior of realistic oligonucleotides, we shall give some insights in the complexity of the dynamical processes triggered in DNA by absorption of UV light, pointing out some of the open issues and of the challenges to be tackled. We shall focus mainly on oligoAdenine,[1,2], dipyrimidine[3-5] and dipurine[6] steps, GC and AT double strands [7,8] and Guanine Quadruplex helices[9]. Our studies show that different kind of excited states, each one often responsible of a different spectral signature and in dynamic equilibrium, are involved in the deactivation pathways.

- [1] R. Improta, V. Barone, *Angew. Chemie.* 2011, 50 , 12016.
- [2] A. Banyasz, et al. *Chem. Eur. J.* 2013, 19 , 3762.
- [3] A. Banyasz, et al. *J. Am. Chem. Soc.* 2012, 134, 14834.
- [4] R. Improta, *J. Phys. Chem. B* 2012, 116, 1426.1
- [5] L. Esposito et al. *J. Am. Chem. Soc.* 2014, 136, 10838.
- [6] Zhang, Y. et al. *Proc. Nat. Acad. Sci. U.S.A.* 2014, 111, 11612.
- [7] Huix-Rotilant, M. et al. *J. Phys. Chem. Lett.* 2015, 6, 2247
- [8] Zhang, Y. et al. *J. Am. Chem. Soc.* 2015, 137, 7059.
- [9] R. Improta, *Chem. Eur. J.* 2014, 20, 8106.