PHOTOISOMERIZATION DYNAMICS OF dMe-OMe-NAIP, A MODEL FOR THE RETINAL CHROMOPHORE

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The N-alkylated indanylidene pyrroline Schiff bases (NAIP) mimic the speed and efficiency of photoisomerization of retinal, whose photoisomerization is a key step in the molecular mechanism of vision. We present here a study of the ultrafast isomerization and subsequent relaxation of dMe-OMe-NAIP, a newly synthesized compound in the NAIP class with less steric congestion near the reactive double bond. We show that the excited-state dynamics of dMe-OMe-NAIP are slower than in previously studied NAIP compounds. This simpler compound also lacks the pronounced coherent vibrational motion observed in retinal and other NAIP compounds. We attribute these differences to pre-twisting about the double bond in the ground state of the previously studied compounds that is absent in dMe-OMe-NAIP. The speed of the isomerization and structure of the electronically excited potential energy surface in NAIP compounds make them attractive targets for studies of vibrationally mediated photochemistry. Previous studies from our group have shown that vibrational excitation before promotion to reactive electronic states can influence the course of reactions in isolated molecules. We seek to extend these experiments to molecules in more complicated environments, specifically the solution phase. To that end, we also present preliminary results of experiments probing the timescale of vibrational energy transfer in dMe-OMe-NAIP and other photoreactive Schiff bases.