

## Fast and Stable Photochromic Oxazines

Françisco M. Raymo

*Center for Supramolecular Science, Department of Chemistry, University of Miami  
1301 Memorial Drive, Coral Gables, Florida, 33146-0431*

In search of strategies to improve the switching speeds and fatigue resistances of spiropyrans, we have designed and synthesized a new family of photochromic compounds based on the photoinduced opening and thermal closing of [1,3]oxazine rings. Specifically, the laser excitation of these molecules at 355 nm cleaves a [C–O] bond with the concomitant opening of a [1,3]oxazine ring in less than 6 ns and with quantum yields ranging from 0.03 to 0.28 in acetonitrile at ambient temperature. This process generates a 4-nitrophenolate chromophore with the concomitant appearance of a ground-state absorption at 440 nm. The photogenerated isomers revert to the original species with first-order kinetics and lifetimes ranging from 25 to 140 ns. Thus, a full switching cycle can be completed on a nanosecond timescales with these photochromic switches. Furthermore, these compounds tolerate thousands of switching cycles with no sign of decomposition even in the presence of molecular oxygen. In addition, these molecules can be trapped within rigid polymer matrices and operated under these conditions with microsecond switching speeds.

