

PHOTOINDUCED REACTIONS AND ULTRAFAST DYNAMICS OF ANTHRACENE-9,10-ENDOPEROXIDE

Alexandra Lauer,¹ Henk Fidder,¹ Karsten Heyne,¹ and Sergey Kovalenko²

1 Department of Physics, Freie Universität Berlin, Arnimallee 14, 14195 Berlin, Germany

*2 Department of Chemistry, Humboldt-Universität zu Berlin, Brook-Taylor-Str. 2, 12489
Berlin, Germany*

E-mail: alexandra.lauer@fu-berlin.de

Anthracene-9,10-endoperoxide (APO) undergoes two different photoinduced reactions depending on the excitation wavelength: Cycloreversion, resulting in anthracene and singlet oxygen ($^1\text{O}_2$), and homolytic cleavage of the peroxide bridge, initially generating a biradical. Eventually this intermediate produces a diepoxide and other rearrangement products like anthraquinone. Room-temperature thermolysis of APO only produces AQ.

The wavelength dependence of the photochemistry of APO was quantitatively investigated by absorption and ^1H NMR spectroscopy. The absolute photoreaction quantum yields of the primary and secondary products were determined for excitation wavelengths from 240 to 450 nm.

The ultrafast dynamics of the photoinduced reactions were investigated using femtosecond UV pump / white light continuum probe spectroscopy. Excitation at 282 nm activates both reaction channels, but signals of different product contributions were separated in the analysis. Anthraquinone and anthracene were measured for comparison. The results on anthracene are supportive in the analysis and interpretation of vibrational cooling processes. Finally the time constants for the photoreaction processes upon APO excitation were deduced from the transient absorption data.