

National Institute of Advanced Industrial Science and Technology (AIST),
AIST Central 5, 1-1-1, Higashi, Tsukuba, Ibaraki 305-8565, Japan

A detailed study on the efficient generation of diradicals has been conducted using excimer lasers. Various factors that control the efficiency of diradical formation were studied using 1,8-bis(substituted-methyl)naphthalenes.

These researches were extended to the study of short-lived species. Conventional studies of short-lived species have been conducted mainly by using spectroscopic methods but these methods often have limitations in some cases when target species are spectroscopically invisible or when spectroscopic overlapping of several species exists. Time-delayed, two-color pulse laser photolysis technique affords a new complementary method for the study of short-lived intermediates based on product analyses. We have used this method for the observation of time profile of naphthylmethyl radicals and determining the efficiency of the photochemical reaction of o-quinodimethane in room temperature solution.

Another example on the application of this method is the determination of kinetic constant for the cycloaddition of o-quinodimethane **2** and maleic anhydride **3**. Although cycloaddition of **2** with alkenes is one of the important synthetic reactions, the rate constant of the reaction, which is one of the important synthetic reactions, has not been reported so far probably due to the difficulty for conducting the experiments by spectroscopic means. We have determined the rate constant of the cycloaddition of **2** and **3** in room temperature solution by analyzing the delay-time dependence of the yields of **4** and **5**.

