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Some applications of cavity ringdown spectroscopy in gas and condensed phases

King-Chuen Lin
National Taiwan University, Taiwan

Abstract

Cavity ring-down absorption spectroscopy (CRDS) is based upon the measurement of the decay rate of light trapped in an optical cavity with high reflectance. When a pulsed laser radiation is guided into an optical cavity, the small amount of light trapped inside the cavity reflects between two highly reflective mirrors (R>99.9%) with a small fraction transmitting through each mirror for each pass. The decay rate of the light leaking out of the cavity is related to the absorption coefficient of the sample in the cavity. Therefore, the CRDS method may ignore fluctuation of incident radiation intensity, with better sensitivity than conventional absorption methods due to a longer optical path. It has been developed as a promising alternative, when modern fluorescence or ionization techniques may not be effectively applied. We have applied this technique to measure the Br_2 elimination channel in the photodissociation of a series of dibromo-alkanes and dibromo-alkenes. Evanescent wave cavity ring-down absorption spectroscopy (EW-CRDS) is one popular technique for the CRDS application in the condensed phase. We have applied this technique to measure the thermodynamic properties and orientation on the surface adsorption for organic dyes.

Biography

King-Chuen Lin received his Ph.D. from Department of Chemistry, Michigan State Univ. in 1982. After postdoctoral career in Cornell University, he joined Department of Chemistry, National Taiwan Univ., Taiwan. He has been awarded as Distinguished Research Fellow of National Science Council, from 1996 to 2002. He is a Distinguished Professor of National Taiwan Univ. from 2005. He received an academic achievement from the Chemical Society located in Taipei in 2009. He has published more than 140 scientific papers in prestigious international refereed journals in the area of physical chemistry, chemical physics and analytical chemistry.