**Crosslinking Chemistry and Biology -Approach of Chemical Biology-**

Yasumaru Hatanaka (Grad. School Med. and Pharm. Sci., Univ. Toyama)

Since there is no strict linear relationship between genome and proteome, proteomics is desirable to address biological functions. Until recently, proteomics was almost synonymous with the mapping of denatured proteins by two-dimensional gel electrophoresis. However, the major question about protein functions is how proteins interact with their partners. The methods of NMR and crystallography are currently the major methods in the field of structural biology. These approaches, however, have limitations for membrane proteins that are often the important receptors of drugs. Thus, the approaches of chemical biology have become increasingly appreciated as a powerful methodology for the functional proteomics.

Among the chemical approaches for the proteomics, photoaffinity labeling have been recognized as a powerful mean for the identification of proteins as well as the elucidation of binding site structure within proteins. Photoaffinity labeling introduces a cross-link between a ligand and its specific receptor for fixing their affinity relationship through a covalent bond, which enables the direct probing of various biological interfaces. Among photoreactive groups used in the photoaffinity labeling, 3-aryl-3-trifluoromethyldiazirines appear to come closest to satisfying the chemical and biological criteria required for useful photophores.[1)]

We recently developed an efficient access to useful diazirine photophores to simplify the time-consuming methods currently used for diazirine synthesis.[2)] Our approach significantly increases the potential of photoaffinity labeling as a rational chemical method for identifying the interacting partner among libraries. Emerging new technologies may extend the application of photoaffinity labeling to become a rapid and more sensitive means for the functional proteomics.

1) Tomohiro T., *et al.*, *Chem. Record,* **5**, 385-395 (2005). 1) Nakashima H., *et al.*, *J. Am. Chem. Soc.*, **128,** 15092–15093 (2006).