

Development of a Vertical Circular Dichroism Apparatus for Measuring Aggregated Biomolecules

Aoyama Kuya¹, Imaura Ryota¹, Hashimoto Satoshi¹, Haga Tastuki¹,
Mohamed Ibrahim², Matsuo Koichi^{1,2}

¹*Graduate School of Advanced Science and Engineering, Hiroshima University*

²*Research Institute for Synchrotron Radiation Science, Hiroshima University*

Keywords: Circular Dichroism, Imaging

Circular dichroism (CD) measurements in the vacuum ultraviolet region (~140 nm) using synchrotron radiation are widely utilized for the precise structural and functional research of biomolecules in solutions. However, for solid and semi-solid biomolecules, such as amyloid fibrils which are causative materials of Alzheimer's disease, liquid-liquid phase separation involved in cellular and biological function regulation, and polymer hydrogels, accurate CD measurements are often difficult due to sample locality and anisotropy, which poses an obstacle to structural and functional research. Therefore, we developed a vertical circular dichroism apparatus and attempted to resolve these issues by using spatially resolved measurements with focused light from lenses and mirrors (which would address sample locality) and by introducing a new optical system [1] to resolve sample anisotropy.

As part of the performance evaluation of vertical apparatus, we measured the CD spectrum of camphor sulfonic acid solution, a standard CD sample, and confirmed an intensity ratio of 1:2 at 290 nm and 190 nm. Spatially resolved measurements were performed on the sample containing L- and D-alanine solutions, as well as on alginate gel sample. Although the resolution was low, the intensity and sign of circular dichroism depended on the position and types of samples. We will present the methods capable of removing sample anisotropy, comparing the conventional system.

REFERENCE

1. G. E. Jellison and F. A. Modine "Two-modulator generalized ellipsometry: theory" *Appl. Opt.* **36**(31) 8190-8198 (1997).