

# フォトンファクトリーでの高圧蛋白質結晶実験 Photon Factory and High-Pressure Macromolecular Crystallography

Leonard M.G. Chavas<sup>1</sup>、永江峰幸<sup>2</sup>、渡邊信久<sup>2</sup>、平木雅彦<sup>1</sup>、山田悠介<sup>1</sup>、  
五十嵐教之<sup>1</sup>、松垣直宏<sup>1</sup>、若槻壮市<sup>1</sup>

<sup>1</sup>構造生物学研究センター、<sup>2</sup>名古屋大学 大学院工学研究科

Recent developments in instrumentation for high-pressure studies of macromolecular crystals have been undertaken at various synchrotron sites. These new implementations have allowed the collection of complete diffraction data with high accuracy from samples subjected to extreme conditions. Thus, previous reports highlighted the analysis of protein crystals at pressures higher than 1 GPa with no clear variation in the crystals' diffraction power. As a direct consequence, increasing interests in high-pressure macromolecular crystallography are nowadays emerging, notably in specific areas of detailed thermodynamic and kinetics. A non-exhaustive list of the principal investigations of interest includes diverse applications to biotechnology developments, the clarification of the effects of high-pressure in deep-sea organisms, or the studies of the influence of compression on proteins' flexibility, possible regulatory factor

of biological functions such as oligomerization or enzymatic activities. Although numerous innovative projects are emerging from these methodologies, they remain poorly investigated because of the limited access to synchrotron facilities providing high-pressure equipment. Taking advantage of the present set-up at PF AR-NW12A, high-pressure studies of macromolecular crystals have been made possible by adapting optional tools to the already installed equipment, such as a diamond anvil cell anchored to the goniometer head, or a bigger light for a proper visualization of the sample within the compressed cell for crystal centering. In this presentation, we will introduce the potential for high-pressure studies at AR-NW12A. Some concrete examples will be discussed for which full data sets of macromolecular crystals submitted to extreme stress have been collected and analyzed.