Hydrogen and Hydration Sensitive Structural Biology

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It is well known that neutron diffraction provides an experimental method of directly locating hydrogen atoms, but unfortunately, to date, there are relatively few examples of neutron crystallography in biology since it takes a long period of time to collect a sufficient number of Bragg reflections. The recent development of a neutron imaging plate (NIP) became a breakthrough event in neutron protein crystallography [1]. At the Japan Atomic Energy Research Institute (JAERI), we have constructed several high-resolution neutron diffractometers dedicated to biological macromolecules (called BIX-type diffractometers), which gives several interesting results regarding hydrogen positions and hydration in proteins and oligomer DNA.

However, neutron protein crystallography still remains an intensity limited technique. Recently next generation spallation neutron sources, such as J-PARC (Japanese proton accelerator research complex) and SNS (Spallation neutron source in USA), are being constructed and several protein crystallography diffractometers will be installed there. Then about two orders of magnitude gain in neutron intensity would be expected and neutrons absolutely expand the field of structural biology. In this microsymposium, the future prospect for neutron protein crystallography will be discussed.

[1] Niimura N., et al, *Nucl. Instrum. Method. Phys. Res*., 1994, **A349**, 521-525.

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