X-ray fiber diffraction from well oriented sols of native thin filament and F-actin

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(1) Contraction of skeletal muscle is regulated through structural changes of the thin filament by Ca-binding to troponin. Troponin molecules locate on the actin filament with an interval of ~ 38 nm. To obtain the structural information on the troponin molecules, layer-lines corresponding to the periodicity should be recorded in the X-ray diffraction pattern. We made the collimator and the helium path with a small beam stop, to record the diffraction patterns in the small-angle-region including 38 nm layer-line reflections from the native thin filament sols. For this purpose, we used the beam stop with a diameter of 0.5 mm and confirmed that this size was large enough to stop the incident beam. Using the beam stop, we succeeded in detecting 38 nm layer-line intensities on the meridian, with a distance between the specimen and the beam-stop of 130 mm using X-ray at the wavelength of 1 Å. However the parasite scattering was observed on the meridian interrupting some layer-lines. In order to reduce the scattering, improved edges of guard slits in the collimator may be required.

(2) Phalloidin suppress the de-polymerization of F-actin into monomers. This phenomena must be associated with structural changes of F-actin. The knowledge of the mechanism of F-actin stabilization by phalloidin is useful to understand the actin polymeization. Therefore we are interested in the effect of phalloidin on the F-actin structure. We recorded diffraction patterns from F-actin sols in the absence and presence of phalloidin. Differences between these patterns include modulation of the reflection intensities in the near-meridional region; in the absence of phalloidin, "27" Å layer-line is weaker whereas "18" Å and "13.5" Å layer-lines are stronger, than in its presence. Another note is that, in the absence of phalloidin, a strong second peak is observed on the "51" Å layer-line.