Hard X-ray Microscopy - A New Tool for Life Science

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Electron microscopes have been very successful in bio-sciences as well as in material sciences with the spatial resolutions down to nanometers. However they can only show either the surface (SEM) or the very thin films (TEM). Furthermore it would be impossible to look at the wet bio-samples as they are.

On the other hand x-rays can penetrate objects, so x-ray microscopes can reveal the internal structures without sample preparations such as fixing, drying, and staining. Recently it became possible to image with sub-micron spatial resolution thanks to the development in x-ray optics. And x-ray microscopes have emerged as a powerful tool for life scientists. In the soft x-ray range of the electromagnetic spectrum the spatial resolutionhas reached 15 nm.[1]. However there is a tendency to push toward harder x-rays to see thicker samples.

We have developed a hard x-ray microscope with a spatial resolution better than100 nm[2] at Pohang Light Source at Pohang, Korea. I am going to introduce the current status of this microscope including recent results, as well as the future plans.

[1] Weilun Chao, Bruce D. Harteneck, J. Alexander Liddle, Erik H. Anderson, and David T. Attwood, Nature **435**, 1210 (2005).

[2] Hwa Shik Youn and Suk-Won Jung, Phys. Med. Biol. **50**, 5417 (2005).