Time-resolved XAS Experiment Using a Microfluidic Cell

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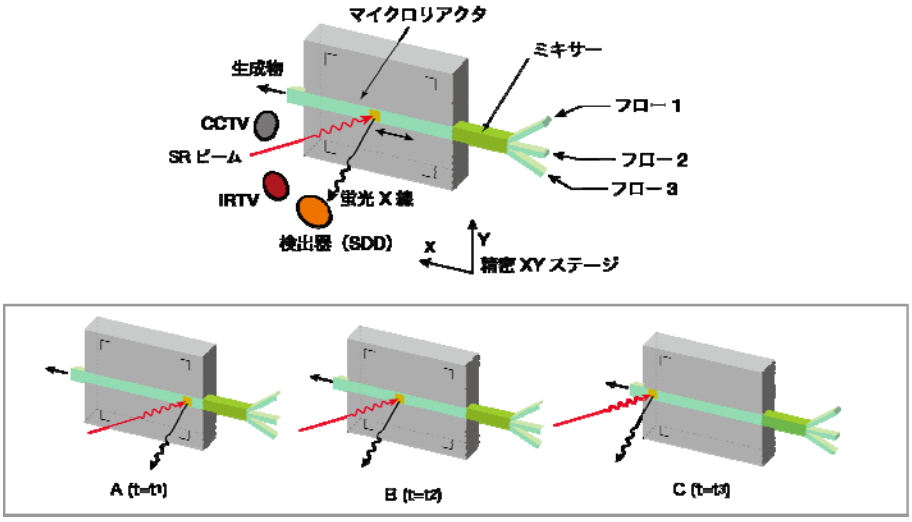
Microfluidic cell used in biomedical research is an ideal research tool for time-resolved chemical reaction in synchrotron radiation research. Here we report the *in-situ* XAS studies on chemical reaction used to synthesize nanoparticles. Colloidal semiconductor nanocrystals, sometimes called quantum dots, have attracted significant attention in recent years due to their size-tunable optical properties and a variety of applications ranging from solar cells, lasers, electroluminescence devices to fluorescent labels in biological imaging. Principle of the measurement system is schematically illustrated below. Along a microfluidic cell (diameter: 250 microns), x-ray beam spot of the same size is shifted and position dependence of fluorescence yield is detected as a function of photon energy.

As microfluidic reactor records time-dependent spectral change as position-dependence,[1] one can record time-resolved EXAFS spectra without degrading statistics.[2] We find that detailed analysis of kinetics yields diameter *D* and concentration *N* of nanocrystals.[3] Detailed analysis of EXAFS data combined with UV-vis spectra led to reliable estimation of fundamental Nanocrystal parameters which are used to optimize growth condition. Current status of microfluidic *in-situ* EXAFS and future prospects are discussed.



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[2] M. Uehara *et al.*, Appl. Phys. Lett. 94, 063104 (2009).
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