



Contribution ID: 35

Type: Oral Communication

The RIKEN microbeam facility: biological application using Fucci cells

Tuesday, 8 July 2014 16:40 (20 minutes)

A microbeam focused by a tapered glass capillary has been developed with a 1.7 MV Pelletron accelerator at RIKEN [1]. A few micrometer thick polymer window was inserted at the end of the capillary tip for evacuating, which allows it to be immersed in a liquid medium. In our facility, three bending magnets downstream of the beamline are used to deviate the trajectories of MeV ions (e.g. protons or helium ions) into the capillary holder at an angle of 45 degree to the vertical axis, above the targeted stage. This enables us to employ a standard 35 mm cell culture dish on an inverted microscope, which can visualize the capillary and cells during and post irradiation.

As one example for biological experiments at our setup, we present the irradiation of HeLa cells expressing fluorescent ubiquitination-based cell cycle indicator (Fucci) system [2]. By this, the fluorescent emission of the nucleus changes between red and green depending on the phase of the cell cycle. Thus, the influence of the cell cycle induced by the irradiation, or the phase in which the cell dies, can be directly visualized by the fluorescent color changes. Furthermore, it might be possible to observe the effects in the neighboring unirradiated cells. To examine this, we irradiated a nucleus of a single Fucci cell inside a cell colony with various doses of 1 MeV protons. After irradiation, time-lapse microscopy was used to monitor the irradiated and non-irradiated cells for about 48 hours, covering two cell cycles. Here, we will show the results of this investigation based on the RIKEN microbeam.

Acknowledgement

We gratefully acknowledge Dr. Atsushi Miyawaki for providing the Fucci cells.

References

- [1] V. Mäckel et al., *Rev. Sci. Instrum.* 85, 014302 (2014).
- [2] A. Sakaue-Sawano et al., *Cell* 132, 487-498 (2008).

Primary author: Dr PUTTARAKSA, Nitipon (Atomic Physics Laboratory, RIKEN, 351-0198 Wako-shi, Saitama, Japan)

Co-authors: HAMAGAKI, MANABU (Atomic Physics Laboratory, RIKEN, 351-0198 Wako-shi, Saitama, Japan); IMAMOTO, NAOKO (Cellular Dynamics Laboratory, RIKEN, 351-0198 Wako-shi, Saitama, Japan); KOJIMA, TAKAO M. (Atomic Physics Laboratory, RIKEN, 351-0198 Wako-shi, Saitama, Japan); KOBAYASHI, TOMOHIRO (Atomic Physics Laboratory, RIKEN, 351-0198 Wako-shi, Saitama, Japan); MÄCKEL, VOLKHARD (Atomic Physics Laboratory, RIKEN, 351-0198 Wako-shi, Saitama, Japan); YAMAZAKI, YASUNORI (Atomic Physics Laboratory, RIKEN, 351-0198 Wako-shi, Saitama, Japan)

Presenter: Dr PUTTARAKSA, Nitipon (Atomic Physics Laboratory, RIKEN, 351-0198 Wako-shi, Saitama, Japan)

Session Classification: Session 3 - Nuclear Microprobe Applications: Biology 1