

Breeding of useful microorganism by neutron irradiation

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1. Introduction

Fermented foods, which are deeply related to the Japanese food culture, provide characteristic flavors and functional ingredients to foods due to the fermentation properties of microorganisms. The breeding of useful microorganisms is expected to create new added value for foods. In these point in mind, exposure of chemicals, UV, X-ray, γ -ray and heavy ion beams have been applied for microorganism breeding, however, little is known regarding the application of neutron yet. Neutron beam induce double strand breakage of DNA molecule as similar to heavy ion beam, like heavy ion beams, therefore expected to produce microorganism with affected fermentation properties with a higher probability than mutations occurring in nature. In this experiment (2022PM4007), the effects of neutron irradiation were investigated on *natto*-fermenting microorganisms.

2. Experiment

The *natto*-fermenting microorganisms were enclosed the screwcap tubes, and these tubes were sealed in aluminum cell (Figure 1) for the neutron irradiation experiments using BL20 (iMateria). These microorganisms were cultivated on agar medium to investigate the effect of neutron irradiation.

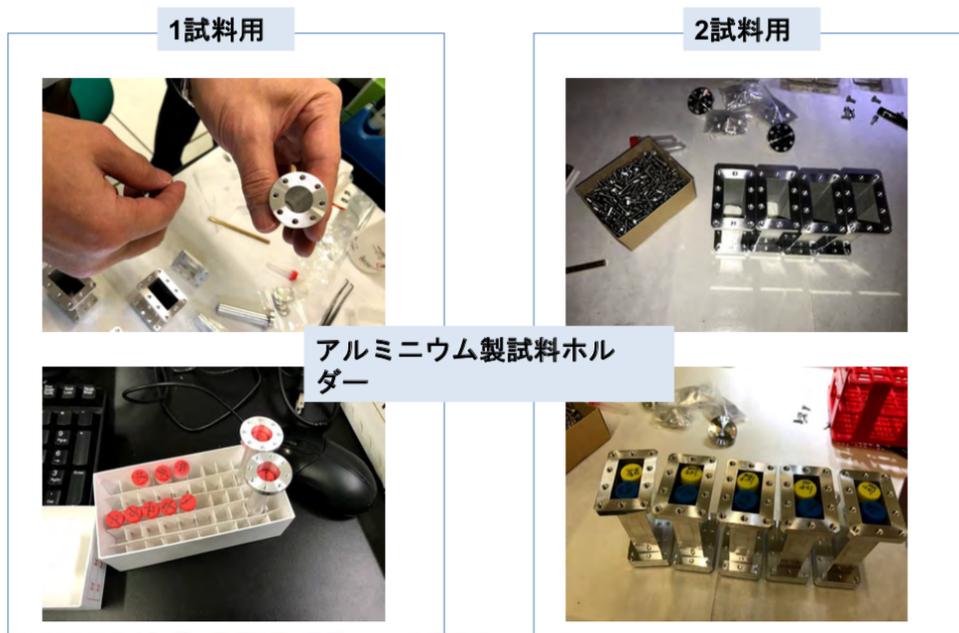


Figure 1. The preparation of samples for neutron irradiation.

3. Results

The number of survival of *natto*-fermenting microorganisms, colony forming unit per mL (ufu/mL), were unchanged unless of irradiation time (5 min, 20 min, 1 hr, 5 hr, 20 hr, and control)

and different strains, in wet sample condition, The neutron irradiation in dry condition showed decrease of survival rate less than 1 %.

4. Conclusion

Neutron beam irradiation showed the effects on the survival of natto-fermenting microorganism therefore the efficiency of mutation seems to be better in dry condition. The mutation on the genome sequence of *natto*-microorganism and the effects of food fermenting properties are underway.