Open Seminar Summery
"Prospect of Radiation Processing and Polymer Modification"

1) International Nuclear Cooperation and Support for Asian Countries (Ms Mai Fukahori, MEXT)

For effective cooperation and contribution for peaceful use of nuclear technology in Asian countries, we are conducting following three programs;

I) The Nuclear Researcher Exchange Program welcomes nuclear researchers from Asian countries to Japan. In this program, Japanese research institutes/universities accept Asian researchers studying and/or working in the field for the peaceful use of nuclear technology for up to 6 months. II) Instructor Training Program invites technical instructors of Asian countries to Japan to participate in training courses for up to 8 weeks. The participants give lectures at the Follow-up Training Course in their countries. They become excellent instructors by the accumulation of teaching experiences year by year through the course. III) Forum for Nuclear Cooperation in Asia (FNCA) is a framework of Asian international cooperation for peaceful use of nuclear technology. Currently, 7 coordinated projects on various nuclear/radiation fields such as industry, environment, healthcare, safety and security, are in progress by experts of member countries. These three programs have synergy for the effective cooperation and contribution.

2) Thailand (Dr Phiriyatorn Suwanmala, Thailand Institute of Nuclear Technology)

Radiation processing has been widely utilized to synthesize a large number of new materials. This extensive utilization is due to the fact that radiation processing is convenient, environmental-friendly, effective, able to initiate reactions at ambient temperature, easier to control compared with chemical processes and requires no initiators. Natural polymers such as starch, cellulose, chitin and chitosan are natural materials with high potential for agricultural, environmental, and industrial use due to their unique properties, especially biodegradability and biocompatibility. The development of novel materials by radiation processing is therefore a promising method to increase the values of these natural polymers which are abundant and inexpensive.

3) Innovative Emulsion Grafting for Sustainable Energy and Environmental Preservation (Dr Masao Tamada, National Institutes for Quantum and Radiological Science and Technology (QST))

Radiation-induced processing of polymer has advantages in homogenity of activation in modifying polymer, environmentally-friendly process, and easy reaction control. There are three major reactions; crosslinking, graft polymerization, and degradation. Especially, the graft polymerization can induce a new function into a trunk polymer. The resulting adsorbents have been applied for collection of uranium from seawater, removal of cadmium from scallop waste, etc. Innovative and environmentally-friendly emulsion graft polymerization conducted by emulsified monomer with help of surfactant in water was invented to achieve the considerable high efficiency of grafting yield. The high efficiency of grafting leads less pre-irradiation dose, less monomer concentration and less grafting time to maintain the same level of degree of grafting as those of the grafting using organic solvent. These advantages was applied to grafting

of less reactive monomers such chloromethyl styrene (CMS) etc. After grafting of CMS the anion and cation catalysts are useful for biodiesel conversion from waste oil in the viewpoint of sustainable energy. A purification filter for washing agent was commercialized with process development in scale up of emulsion grafting of glycidyl methacrylate (GMA). Low energy electron accelerator connected with grafting reactor was developed for a batch scale synthesis of grafted fabric. This system produced the grafted fabric, 0.3 m wide and 25 m long, for metal adsorbent within 30 minutes. Moreover, the high efficiency of emulsion grafting enable the grafting using polyethylene bottle with tight-fitting lid. This method does not need a special glass experimental ampoule for grafting and vacuum lines. Grafting experiment can be started in any laboratories without the preparation threshold of experimental apparatus and equipment in developing countries.

4) Kazakhstan (Mr Alexander Borissenko, JSC " The Park of Nuclear Technologies")

No summary

5) Modification of PET Track-Etched Membranes by Graft Polymerization of Functional Monomers for Membrane Distillation, Catalysis and Sensing (Mr Ilya Korolkov)

The paper provides with the results of Research Report on field testing of SWA application as a water-retaining agent for planting of wheat and chickpea in a climate of the South of Kazakhstan. This research has been conducted within the project "Production design for radiation cross-linked SWA" by the Nuclear Technology Park JSC.

There are statistics for the crop yield of wheat and chickpea cultivated with the various SWA application rates, yield structure analysis and cost-effectiveness of SWA application for two years of field tests in the South of Kazakhstan.

The preliminary estimates on field testing of SWA application for planting of pine trees are provided in the Progress Report as well. The latter field test has been carried out with the Forest Reserve "Semey Ormany".