Summary of Session 5A

Chairman: Dr. J. Kloosterman (Netherlands)

In this session, posters were presented with a large variety of subjects and scopes ranging from short-term to long-term research.

The presentation started with the poster of Dr. Emoto (PNC) about the status of the electron accelerator, which could be used to transmute radioactive fission products with a small neutron capture cross section. Possible candidates of such fission products were Sr-90 and Cs-137.

The next three posters by Drs. Kusano, Nishida and Takada gave a coherent overview of work done at JAERI on Accelarator Driven Systems. The second poster dealt with the status of the R&D on the proton linac with energy of 1.5 GeV and an average current of 5 mA. This was already a big step towards an accelerator with a current of 40 mA needed for ADS. The third poster focused on the improvement and benchmarking of the NMTC cascade code and its inclusion in the ATRAS code system. This code can now be used to model the spallation reaction and high-energy fission processes, the neutron transport, and the core burn-up. It had been used to design two types of reactor systems: a nitride-fueled reactor for the short term and a molten salt fueled reactor for the longer term. Both systems were capable of transmuting the minor actinide production of ten units of 1 GWe LWRs. The benchmarking of the new ATRAS code system with experimental data was described in the fourth poster of this session by Dr. Takada.

Some interesting measurements were presented in the fifth and sixth poster presentations by Dr. Harada of PNC and Dr. Oigawa of JAERI. In the fifth poster, the measurements of thermal cross sections and resonance integrals of some important fission products were described. Interestingly, the cross section of Tc-99 was much larger than that assumed untill now. For Sr-90 and Cs-137, the measurement of the photonuclear cross sections was in progress. In the sixth poster, the neutron fission yields and the delayed neutron data of some minor actinides were presented. Both fields were very important for the future development of burner reactors loaded with large amounts of minor actinides and fission products.

The last two posters dealt with the development of nitride fuels for future fast reactors. In the seventh poster, by Y. Arai, the lattice parameter, vapour pressure and thermal conductivity were presented for solid solutions of neptunium-plutonium mixed nitrides. Given that thermodynamic data on nitride compounds of minor actinides were not well known, that paper constituted a valuable contribution. Much work remained to be done, even on oxide compounds of minor actinides. The eighth paper, by M. Akabori, provided a better insight on nitride forming reactions in liquid alloys, which was of interest for the conversion of metallic fuels to nitrides.

In general, it was very positive that measurements of cross sections, neutron fission yields, and thermodynamic data had been performed, because the importance of such data cannot be easily underestimated. Also the validation and benchmarking of codes being used for new applications like accelerator driven systems were quite important. Future work on those subjects would further advance P&T research.

The non-technical aspects of the session concerned mainly the economics of accelerator driven systems. Since every stage of the nuclear fuel cycle was expected to become more expensive in the long term, the design of an accelerator driven system, which may consume up to 40 per cent of its own generated electricity, should be carefully investigated in order to make such systems as cheap as possible. Additionally, issues related to licensing should not be forgotten.