# Activation analysis of tritium breeder lithium lead irradiated by fusion neutrons in FDS-II (P4-I-501)

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R&D of fusion materials, especially their activation characteristics, is one of the key issues for fusion research in the world. Research on activation characteristics for low activation materials, such as reduced activation ferritic/martensitic steels, vanadium alloys and SiCf/SiC composites, is being done throughout the world to ensure the attractiveness of fusion power regarding safety and environmental aspects. However, there is less research on the activation characteristics of the other important fusion materials, such as tritium breeder etc.. Lithium lead (Li17Pb83) is presently considered as a primary candidate tritium breeder for fusion power reactors because of its attractive characteristics. It can serve as a tritium breeder, neutron multiplier and coolant in the blanket at the same time. The radioactivity of Li17Pb83 by D-T fusion neutrons in FDS-II has been calculated and analyzed. FDS-II is a concept design of fusion power reactor, which consists of fuison core with advanced plasma parameters extrapolated from the ITER (International Thermonuclear Experimental Reactor) and two candidates of liquid lithium breeder blankets (named SLL and DLL blankets). The neutron transport and activation calculation are carried out based on the one-dimensional model for FDS-II with the home-developed multi-functional code system VisualBUS and the multi-group data library HENDL1.0/MG and European Activation File EAF-99. The effects of irradiation time on the activation characteristics of Li17Pb83 were analyzed and it concludes that the irradiation time has an important effect on the activation level of Li17Pb83. Furthermore, the results were compared with the activation levels of other tritium breeders, such as Li4SiO4, Li2TiO3, Li2O and Li etc., under the same irradiation conditions. The dominant nuclides to dose rate and activity of Li17Pb83 were analyzed as well. Tritium generated by Li has a great contribution to the afterheat and activity of tritium breeders but has no contribution to its dose rate. If the tritium produced in it is extracted completely, the activation levels of tritium breeder become much lower and the element Li after irradiation has little contribution to the activation level of Li17Pb83.