Application for Plasma Diagnostics with $D(\alpha,\gamma)^{6}$ Li Gamma-ray

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In order to measure the energy and the density of the energetic alpha particle in the D-T plasma, we experimentally examined the utilization of the gamma-ray measurement with $D(\alpha,\gamma)^6Li$ has been currently curried out using a target of deuteride polyethylene and α particle beam (2.-5 MeV) by the tandem pelletron accelerator ,5SDH-2, in Kobe university. A high purity Ge semiconductor detector that has 25% efficiency was used to measure gamma-rays and it was covered with lead blocks and some neutron absorber to reduce the production of neutrons and 2.22-MeV gamma-ray from H(n, γ)D reaction. Because the photo peak of 2.18-MeV gamma-ray corresponding to the first excited level of Li-6 was obviously determined from our experiment, it was shown that it was useful as the diagnostics of the alpha particle. However, the measurement of the 2.18-MeV gamma-ray was difficult without the complete configuration by shielding materials. Therefore, it was found that the optimization of the shielding materials was important to use the gamma ray from $D(\alpha,\gamma)^6Li$ reaction as the diagnostics of the energetic alpha particle.