We have proposed the concept of JBR-Process (JAERI Beryllium Recycle Process) for neutron multiplier and plasma facing material in a fusion reactor, and a dry method utilizing chlorination reaction (metal-Be or Be-compounds + Cl₂ → BeCl₂ <volatile> → Be <recovered> + Cl₂) for reprocessing the irradiated beryllium has been developed. By this method, beryllium resource can be recovered and the radioactive nuclides (ex. Co-60, tritium, etc.) contained in beryllium can be separated from recovered beryllium with high efficiencies (Co-60: above 96%, tritium: above 99%).

In this study, in order to develop a practical technology of beryllium resource recovery from used materials, the recovering method of beryllium metal was improved. As the recovering method of beryllium metal, hydrogen gas injection method was applied at a lower temperature (about 450°C) instead of the current pyrolysis method of gaseous BeCl₂ at a high temperature (about 1200-1500°C) using SiC nude heater. By this improvement, it is confirmed that JBR-Process becomes still more practical for recovering beryllium resource.