Contribution ID: **22** Type: **oral presentation**

Production mechanism of heavy and superheavy nuclei in multinucleon transfer reactions near Coulomb barrier energies

Thursday, 22 August 2019 16:25 (15 minutes)

To reach heavy neutron rich nuclei region and superheavy stability island, multinucleon transfer reaction is the most possible way, which has been investigated within dinuclear system model. The calculated transfer cross sections can reproduce the experimental data nicely. The transfer dynamics in the reaction of ^{124,132}Sn+^{238}U/^{248}Cm near Coulomb barrier energies is thoroughly analyzed. It is found that the total kinetic energies of primary fragments are dissipated from the relative motion energy of two touching nuclei and exhibit a symmetric distribution along the fragment mass. The angular distribution of the projectile-like fragments is moved forward with increasing the beam energy. However, the target-like fragments exhibit an opposite trend. The shell effect is pronounced from the fragment yields in multinucleon transfer reactions. More neutron-rich radioactive projectile ^{132}Sn in comparison to the stable beam ^{124}Sn are favorable to produce neutron rich nulcei with massive nucleons transfer. Numerous unknown neutron rich isotopes in prediction have been listed in form.

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Session Classification: Young Scientist Session 1