Searching the onset of nuclear dissipation in the fusion reactions ^{16,18}O+^{194}Pt via ER measurements

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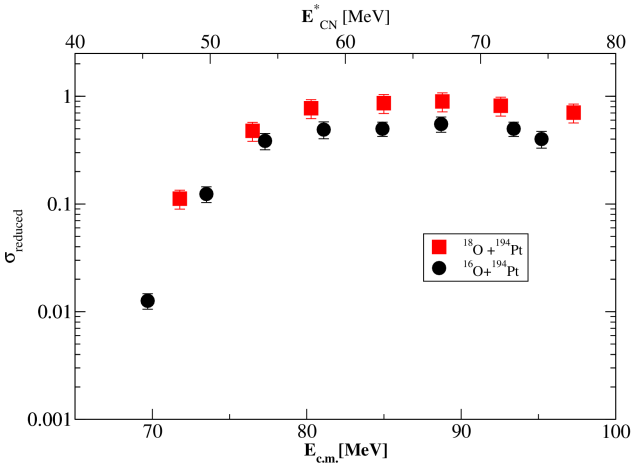
Dissipative forces [1] play an important role in heavy ion fusion-fission reactions. Dissipation increases the fission life–time relative to the Bohr–Wheeler estimates [2] and enhances the particle emission probability from the hot composite system. Charged particle multiplicites, neutron multiplicities, GDR-γ ray multiplicities and evaporation residues (ERs) are used as the experimental probes for studying the role of nuclear dissipation in heavy-ion reactions. Among these, ERs are the best suited probe to investigate pre–saddle dissipation at higher excitation energies.

We measured ER cross section for ^{16,18}O+^{194}Pt reactions at energies $\sim$5% below to $\sim$25% above the Coulomb barrier. The experiments were performed using the gas-filled recoil separator HYRA [3] at IUAC, New Delhi. The reduced ER cross sections of the two reactions are shown in the figure. It has been observed that for ^{16}O+^{194}Pt reaction (forming the compound nucleus (CN) ^{210}Rn with neutron number N=124), Bohr–Wheeler estimates under predict the cross section. A dissipation strength of β=1.5 is required for fitting the experimental data [4]. The latter reaction forms the CN ^{212}Rn with N=126, a neutron magic number. Back *et al.,* [5] observed that in shell closed nuclei much higher energy is required for the onset of dissipation in comparison with non–shell closed nuclei. We extend this study to further systems populating CN with N=126 and 124. The measurements, analysis and statistical model calculations will be discussed in detail.



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