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Incomplete Fusion Dynamics in Reactions Induced by Alpha and Non-Alpha Cluster Projectiles at Low Energies

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In the reactions induced by weakly bound, tightly bound heavy ions and radioactive ion beams, Incomplete fusion (ICF) dynamics has been an issue of prime interest among nuclear physicists over past decade. The studies with projectiles having alpha structure like 12C, 16O and 20Ne has established the onset of ICF dynamics at energy as low up to Coulomb barrier. Exclusive entrance channel systematics has also been presented by number of researchers. In recent past our group has published the measurements with alpha structure projectile for Vanadium (51V) target that follow the systematics of ICF dynamics, based on various entrance channel parameters, including projectile energy, mass asymmetry (μA) of interacting partners, Coulomb factor (ZpZT), neutron skin thickness of target, and target deformation. In the preset report we have made an effort to have the same measurements for the same target (51V) with a non- alpha cluster beam i.e.,19F. The stacked foil activation technique has been used. The measured excitation functions (EFs) for several reaction residues produced in the interaction of 19F+51V system have been studied at energies above the Coulomb barrier and to our knowledge are presented for the first time. The measured EFs are compared with the theoretical estimations obtained from the statistical model code. To comprehend the ICF dynamics in a decisive way, the ICF fraction has been deduced and explored its reliance on various entrance channel parameters. It may be concluded that ICF probability is greatly influenced by various parameters of entrance channel and not only a single parameter is able to explain the systematic of ICF dynamics in a decisive way.

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