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Fragmentation mechanism of neon dimer induced by O₆₊ ions

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Since the prediction of the Interatomic Coulombic Decay (ICD) by Cederbaum et al. in 1997 [1], the rare gas atomic dimers have been widely investigated by photon impact. However, the investigation of dimers with the ions and electrons as the projectile is still scarce [2-6]. For neon dimer, only a few works involved with heavy ions were reported [4]. Utilizing the reaction microscope [7], we investigated the fragmentation of neon dimer induced by highly charged O₆₊ ion at the projectile energy of 240 keV.

In the present work, we clearly observed four peaks in the spectrum of kinetic energy release (KER) for Ne⁺-Ne⁺ pair, which locate at 4.5, 7.3, 8.5, and 9.7 eV, and are marked by A, B, C, and D successively. By comparing with the potential curve of Ne₂ [8], we clarified the fragmentation mechanisms of them. The peak A results from the coulombic explosion (CE) and ICD, while the peak B results from radiation charge transfer (RCT) of one-site states Ne²⁺(2p⁴)-Ne. The peaks C and D can be ascribed to the contribution of the radiationless charge transfer [9]. These two peaks were the first time observed in transfer ionization and pure double electron capture processes induced by heavy ions.

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