

Response of metal clusters to elastic electron impact

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We perform a theoretical study of the response of neutral and ionized metal clusters to the elastic impact of slow electrons. We center our attention on Na₄₀ and Na₄₁⁺ closed-shell clusters. A phase-shift analysis is performed for both systems. The total cross section for the neutral cluster presents resonances related with the existence of quasibound states when studied as a function of incident energy. For the ionized cluster we show the calculated ratio of the angular distribution to the Rutherford differential cross section, near and far from a resonance. The existence of resonances as well as the associated energies are very sensitive to the mean interaction potential. As a consequence, elastic scattering of slow electrons on clusters could be a useful tool in the study of the electronic structure of clusters. © 1995 The American Physical Society.