

Two-Photon Ionization of Silver Clusters

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Abstract : Resonant two-photon ionization (TPI) is a valuable technique for the study of clusters due to its ultrahigh sensitivity. The comparison of the observed TPI spectra with results of calculations allows to deduce important information on the shape, rotational and vibrational temperatures of the clusters with high accuracy. In this communication we calculate the TPI cross-section for pump-probe scheme in Ag neutral cluster. The pump photon energy is chosen to be close to the surface plasmon (SP) energy of cluster in dielectric media. Since the interband transition energy in Ag exceeds the SP resonance energy, the main contribution into the TPI comes from the latter. The calculations are performed by separating the coordinates of electrons corresponding to the collective oscillations and the individual motion that allows to take into account the resonance contribution of excited SP oscillations. It is shown that the ionization cross section increases by two orders of magnitude if the energy of the pump photon matches the surface plasmon energy in the cluster.

Keywords : resonance enhancement, silver clusters, surface plasmon, two-photon ionization

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