RESONANT TWO-STEP IONIZATION OF Rb AND Cs ATOMS ON HELIUM NANODROPLETS

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Rb and Cs atoms on the surface of helium nanodroplets are ionized by applying a monomer selective resonant two-step ionization scheme. We show that in addition to Rb[a] also Cs atoms stay bound on the surface of helium nanodroplets when excited into the $n^2\mathrm{P}_{1/2}$ (Rb: $n = 5$, Cs: $n = 6$) state. Rb atoms are selectively excited either to the $5^2\mathrm{P}_{1/2}$ or to the $5^2\mathrm{P}_{3/2}$ state and ionized with a pulsed laser[b]. The formation of stable Rb^+–$\mathrm{He_n}$ ($n < 20$) complexes is observed by ionization via the $5^2\mathrm{P}_{3/2}$ state. Ions with masses of up to several thousand amu have been monitored, which can be explained by an immersion of the single Rb (Cs) ions into the helium nanodroplet upon ionization via the $5^2\mathrm{P}_{1/2}$ ($6^2\mathrm{P}_{1/2}$) state.

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[b] M. Theisen, F. Lackner, and W.E. Ernst, Phys. Chem. Chem. Phys., 45, 14861-14863 (2010)