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Metal cluster anions produced by attachment of slow electrons: Evaporative cooling, cluster energetics, and restructuring of the abundance spectra[1] VITALY KRESIN, ROMAN RABINOVITCH, CHUNLEI XIA, University of Southern California — Metal clusters are able to attach low-energy electrons with very large cross sections by capturing them in a strong long-range polarization potential. But little information has been available about the last stage of the collision process: what happens to the energy deposited by the captured electron, and are the cluster size distributions modified? We have carried out measurements of the mass spectra of negative sodium cluster ions born in the electron-cluster interaction region. Importantly, the arrangement allowed us to monitor the parent and the daughter cluster beams simultaneously. It is found that the electron affinity energy is quickly thermalized and is sufficient to cause rapid evaporative cooling. As a result, the magic numbers shift from Na_n to Na^-_{n-1}, and a host of other significant changes in the abundance structure are observed, compared to the parent cluster beam. These are well reproduced by a detailed analysis based on the evaporation cascade model, and yield new information about cluster binding energies.

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