

ejected when the excimer laser strikes the aluminum end of the pulsed supersonic nozzle (and a preskimmer located several cm downstream). These slow electrons then undergo an extremely efficient attachment process to form negative metal cluster ions in the supersonic jet. This attachment process is so efficient that we presume the dominant mechanism is dissociative electron attachment accompanied by the loss of a metal atom from the cluster. At the same time, positive clusters are produced by direct photoionization, and the net effect is again to produce a neutral cold plasma which now contains both positive and negative cluster ions, all of which feel the full cooling of the supersonic expansion. A figure showing negative niobium cluster ions is attached.

We are quite excited as to the long range impact of this cold ion beam technology -- it should be quite generally applicable to a wide range of species, not just small metal clusters.