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Delayed Ionization Studies of Metal-Carbon Clusters[1] KEVIN DAVIS, SAMUEL PEPPERNICK, A. CASTLEMAN, JR., The Pennsylvania State University — Clusters of molecules, restricted to the nanometer size regime, display reduced size phenomena associated with the effects of quantum confinement. One such occurrence, termed delayed ionization, is a fascinating phenomenon that has been observed in various metal, fullerene and metal-carbon cluster systems. Generally, favorable candidates to display delayed ionization characteristics are clusters containing a significant number of vibrational modes. Furthermore, the magnitude of the cluster's ionization potential must be in competition with its binding energy, whereby dissociation is impeded compared to ionization. The mechanism most commonly used to explain the delayed emission of electrons is termed thermionic emission. In order to interrogate this effect, delayed ionization studies are performed on early transition metal-carbon cluster systems. These clusters are produced in a laser induced plasma reactor cluster source coupled to a nanosecond ultraviolet photoionization laser, and are detected via the microchannel plates of a reflectron time-of-flight mass spectrometer. In this work, interesting delayed ionization characteristics of metal-carbon clusters will be presented in an effort to provide a better understanding of the relaxation processes that occur within clusters.

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Kevin Davis
The Pennsylvania State University

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