

SIMULTANEOUS DEPOSITION OF MASS SELECTED ANIONS AND CATIONS: IMPROVEMENTS IN ION DELIVERY FOR MATRIX ISOLATION EXPERIMENTS

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A focus of the research in our group has been to develop improved methods for ion delivery in matrix isolation experiments. We have previously reported a method to co-deposit low energy, mass selected metal anions and a rare gas counter cation.^a A modification allowing for mass selection of both the anion and cation will be discussed. Results from preliminary experiments of mass selected, low energy Cu^- and SF_5^+ will also be highlighted. To our knowledge, these experiments are the first time two mass selected beams of ions have been simultaneously deposited into a cryogenic matrix. Co-deposition of the ions into an argon matrix doped with 0.02% CO at 20K resulted in the observation of bands assigned to SF_5^+ and anionic copper carbonyl complexes, $\text{Cu}(\text{CO})_n^-$ ($n=1-3$). Upon irradiation of the matrix with a narrow band, blue LED, the copper carbonyl complexes are converted to the neutral analogues, while the fate of the photodetached electrons can be directly tracked, as a decrease of the SF_5^+ band and a growth of the neutral SF_5 band are observed.

^aLudwig, R. M.; Moore, D. T.; J. Chem. Phys. 139, 244202 (2013).