DEVELOPMENT OF A SHEATH-FLOW SUPERCRITICAL FLUID EXPANSION SOURCE FOR VAPORIZATION OF NONVOLATILES AT MODERATE TEMPERATURES

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Thermal vaporization followed by cooling in a supersonic expansion is an effective method for producing cold vapor for spectroscopic analysis, and can be used even for large molecules such as pyrene[a]. However, for very low volatility molecules such as fullerenes, the extreme temperatures needed can lead to incomplete internal cooling[b] or thermal decomposition. We have developed a supercritical fluid expansion source which allows us to vaporize non-volatile molecues, such as fullerenes and large polycyclic aromatic hydrocarbons, at moderate initial temperatures ($\sim$ 450 K) prior to supersonic cooling. We will discuss the influence of various operating parameters, such as fluid composition, fluid temperature and nozzle temperature, on the final translational and internal temperatures of test molecules volatilized with this source, as well as discussing possible applications.

[a] B. E. Brumfield, J. T. Stewart and B. J. McCall *J. Chem. Phys. Lett.* **3**, 1985 (2012).

[b] B. M. Gibson, J. T. Stewart, B. E. Brumfield and B. J. McCall, contribution FB05, presented at the 67th International Symposium on Molecular Spectroscopy, Columbus, OH, USA, 2012.