Mid-Infrared Continuous Wave Cavity Ringdown Spectrometer for Acquisiton of the High-Resolution Spectrum of C_{60}

BRIAN E. BRUMFIELD, JACOB STEWART, *Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, IL 61801*; BENJAMIN J. McCALL, *Departments of Chemistry and Astronomy, University of Illinois at Urbana-Champaign, Urbana, IL 61801.*

Buckminsterfullerene (C_{60}) was originally discovered in experiments seeking to understand carbon star outflow chemistry. Since its initial discovery, indirect evidence has been found for the existence of C_{60} in space, including its presence in impact craters on the Long Duration Exposure Facility. In order to provide direct evidence for the presence of extraterrestrial C_{60}, it will be necessary to perform a spectroscopic search. A high-resolution gas-phase spectrum of C_{60} will be necessary to perform such a search and we are seeking to obtain this spectrum in the mid-infrared at $\sim$8.5 μm. To do this, we are using a quantum cascade laser coupled to a continuous wave cavity ringdown spectrometer in conjunction with a high temperature supersonic expansion source. We present preliminary results from our spectrometer using methylene bromide (CH_2Br_2) as a test molecule and discuss progress towards obtaining a C_{60} spectrum.

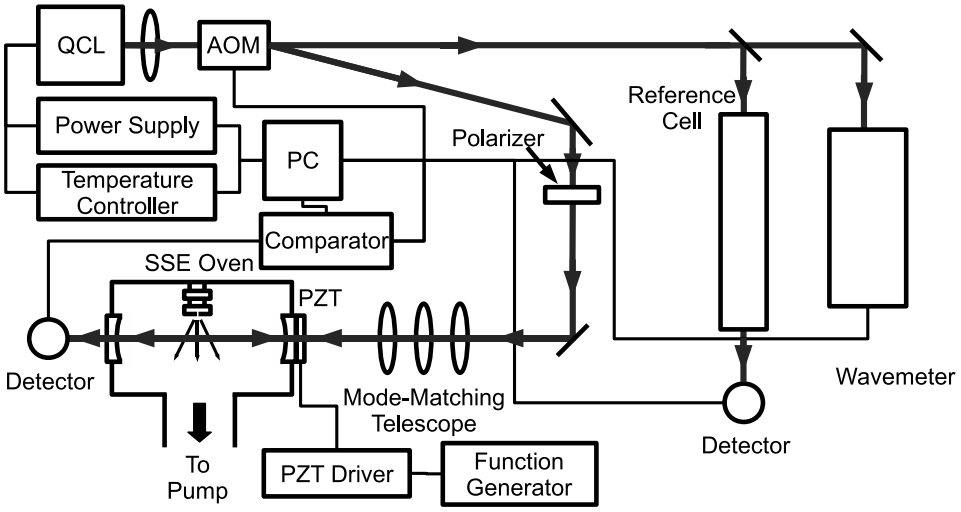

Figure 1. Block diagram of our cavity ringdown spectrometer. QCL = quantum cascade laser, AOM = acousto-optic modulator, PC = personal computer, SSE = supersonic expansion, PZT = piezoelectric transducer