HIGH RESOLUTION INFRARED SPECTROSCOPY OF THE CO$_2$-CO DIMERS AND (CO$_2$)$_2$-CO TRIMER

A. J. BARCLAY, S. SHEYBANI-DELOUI, Department of Physics and Astronomy, University of Calgary, Calgary, AB, Canada; K. H. MICHAELIAN, CanmetENERGY, Natural Resources Canada, Edmonton, Alberta, Canada; BOB McKELLAR, Steacie Laboratory, National Research Council of Canada, Ottawa, ON, Canada; NASSER MOAZZEN-AHMADI, Department of Physics and Astronomy, University of Calgary, Calgary, AB, Canada.

Infrared spectra in the carbon monoxide CO stretch region (≈2150 cm$^{-1}$) are assigned to the previously unobserved O-bonded form of the CO$_2$-CO dimer (“isomer 2”), which has a planar T-shaped structure like that of the previously observed C-bonded form (“isomer 1”). Results will also be reported for both isomers of the $^{12}$C$^{18}$O$_2$-substituted form of the dimer. In addition, we have observed two combination bands for each isomer yielding the first experimental determinations of intermolecular frequencies for the planar T-shaped structures. Within both of the fundamental bands, weak “satellite bands” are observed. These are tentatively assigned to the trimer He-CO$_2$-CO. To the higher side of the fundamental for “isomer 1”, we have observed a weaker b-type band which we have assigned to (CO$_2$)$_2$-CO trimer. This trimer has a “pin wheel” structure with C2 symmetry and the derived experimental structural parameters match well with those obtained from ab initio calculations.