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Laboratory Studies of Solid Carbon Dioxide in Planetary and Interstellar Ices

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Abstract:
Laboratory spectra have shown that CO_2 is a powerful diagnostic tool for analyzing infrared data from remote observations, as it has been detected on icy moons in the outer solar system as well as dust grain surfaces in the interstellar medium. IR absorption profiles of CO_2 within ice mixtures containing H_2O and CH_3OH change with respect to temperature and mixture ratios. In this particular study, the CO_2 stretch mode around 2350cm^{-1} (4.3 microns) is systematically observed in different mixtures with H_2O and CH_3OH in temperature ranges from 15 K to 150 K, as well as vibrational modes in the near-IR such as the combination bands near 3700 cm^{-1} (2.7 microns) and 5080 cm^{-1} (2.0 microns). Additionally, some high-temperature deposits (T > 50 K) of H_2O, CH_3OH, and CO_2 ice mixtures were performed to determine the maximum temperatures at which CO_2 will deposit on the sample window. These data may then be used to interpret spectra obtained from remote IR observations. This research was sponsored by Oak Ridge Associated Universities (ORAU) through the NASA Postdoctoral Program (NPP) as well as Ames Research Center and the SETI institute who provided facilities and equipment.

Plain-Language Abstract:
Carbon dioxide has characteristic infrared absorption features that change according to temperature and what other species are present within the ice. Reproducing ices in the laboratory allows us to observe specific conditions such as temperature and mixture ratios in a controlled environment.

Speaker Agreement (Complete):
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Linking Groups (Complete): None selected
Category (Complete): 43. Laboratory Astrophysics
Preplanned Sessions (Complete):
Presentation Preference (Complete): Poster
Additional Info (Complete):
Has this work been submitted in any form to a journal or preprint server, or if you expect it to be submitted between now and the meeting?: Yes

If you selected yes, to what publication(s) and/or preprint server(s) has this work been (or will this work be) submitted? : Astrophysical Journal
Is this your first presentation at an AAS Meeting?: No
Student Status: None
I am willing to serve as a Chair: No
I am willing to serve as a poster Judge: No

Status: Complete

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