Laboratory Demonstration and Test of Solar Thermal Asteroid ISRU

Team

PI/Co-PI:
L.S. Gertsch, Missouri S&T
J.C. Sercel, ICS Associates Inc.

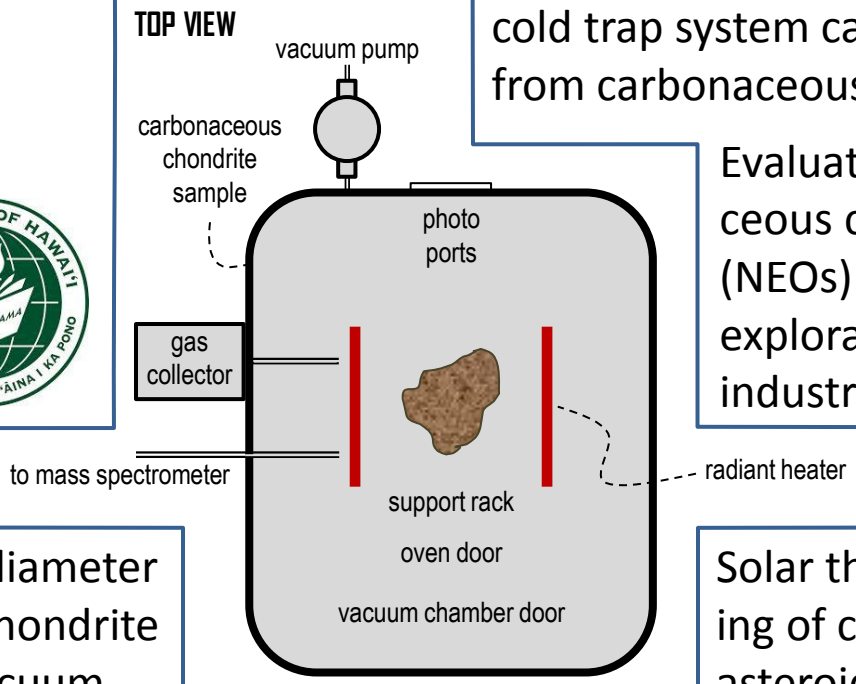
Investigators:
R. Jedicke, Univ of Hawaii
A.N. Krot, Univ of Hawaii
R.P. Mueller, NASA

Objectives

Take the concept of pyrolyzing CI and CM chondrite meteorites to produce H_2O, SO_2, and CO_2 from TRL-2 to TRL-3.

Demonstrate that a solar thermal furnace and cold trap system can separate water practically from carbonaceous chondrite asteroids.

Evaluate the utility of carbonaceous chondrite near-Earth objects (NEOs) for supporting space exploration and enabling orbital industries.



Approach

Heat ~10cm-diameter samples of carbonaceous chondrite meteorites radiatively in vacuum,

Identify water vapor and other gases as they outgas from the sample,

Collect the evolved volatiles in a cold trap, and

Measure the physical properties of the leftover solid material.

Impact

Solar thermal processing of carbonaceous chondrite asteroids, a common NEO type, is crucial for producing propellants and life-support water using minimal launch mass and minimal operational complexity. Practical demonstration will fundamentally alter the economics of human exploration beyond LEO and will seed the industrialization of space.