
Ultrasonic/Sonic Drill/Corer (USDC) as a Sampler and Sensor Platform

Y. Bar-Cohen, X. Bao, N. Bridges, Z. Chang, B. Dolgin, C. McKay, S. Sherrit

Jet Propulsion Laboratory/Caltech, MS 82-105,
4800 Oak Grove Drive, Pasadena, CA 91109-8099,
yosi@jpl.nasa.gov, web: <http://ndea.jpl.nasa.gov>)

and

T. Peterson, Cybersonics, Inc.

ABSTRACT

The search for life in the Universe is one of the most important aspects of NASA's mission. Studies of life and fossilization processes in extreme environments show surface damage and drilling is essential for astrobiology studies. However, conventional techniques are limited by the need for high axial force. A novel USDC mechanism was developed by the authors to overcome this and other limitations of conventional drilling techniques. It has been shown to drill ice and a variety of rocks including granite, diorite, basalt and limestone and a scaled up version was demonstrated to allow for deeper drilling. A NASA ASTID task is underway to develop a breadboard of an ultrasonic percussion sampler and sensor platform for acquisition and characterization of the extracted core and powdered cuttings. The breadboard is designed to probe the medium prior to coring in order to optimize the selection of sites with likelihood of containing biological signatures. A sample set will be chosen to represent biological markers and will be used to determine the degree to which the cored rocks and acquired powder cuttings are modified by the sampling process. The developed miniature, low power, low cost breadboard will be sought for technology insertion in future missions.