

## Analytical Assessment of Intact Capture Capability for Possible Biological Signatures within Icy Plume Particles by Using Hydrophilic and Hydrophobic Aerogels

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Cassini Spacecraft's Ion Neutral Mass Spectrometry (INMS) and Cosmic Dust Analyzer (CDA) have provided significant scientific data regarding Saturn's icy moon Enceladus and its ongoing plume activity. Scientific evidences have put constraints on environmental parameters for the subsurface ocean. However regarding life detection, current on-board space mission instruments rely solely on destructive analytical techniques. By targeting the Enceladus plume, we propose a new astrobiology oriented life detection mission concept using silica aerogel for development of sample capture, in situ analysis and sample return technologies. Silica aerogel is a super low density amorphous SiO<sub>2</sub> (density range between 0.01 g/cm<sub>3</sub> and 0.03 g/cm<sub>3</sub>) and has optical transparency and low thermal conductivity (0.017 W/mK). These features of silica aerogel are expected to be suitable for non-destructive and non-invasive capture of samples. In this research, we compare the ability of organic sample capture in two different types (hydrophilic and hydrophobic) of aerogel. Currently new aerogel capture system is under development and thus we will discuss advantages and current problems of this system including the application for future space missions related to biosignature detection from the icy moons.

Keywords: Icy moon, Aerogel, Sample return mission, Astrobiology