



Microfluidic Biomarker Extraction Based on Modulation of Dielectric Constant of Water

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Efficient extraction of organic biomarkers from planetary and lunar regolith is necessary to enable successful detection and analysis of organics in robotic in situ exploration missions. Over the past years, we have developed extraction technology that utilizes a single, non-toxic solvent - water - to rapidly and efficiently extract organic compounds. Currently water-based biomarker extractor is a front-end sample processing component of the Urey instrument selected by ESA as part of the ExoMars mission. Here we will present a new compact microfluidic extraction device (uEX) that combines two mature technologies: biomarker water-extraction and terahertz technologies. uEX is a unique, low-mass and low-power instrument suitable for future in situ missions to Mars, Titan, Europa, and small bodies in the Solar System. Our new device represents the transition from current macroscale aqueous extraction to the microfluidic scale since it uses the THz (100 - 900 GHz) frequency modulation of the dielectric constant of water.