



ENIJA : Search for life with a high-resolution TOF-MS for in-situ compositional analysis of nano- and micron-sized dust particles

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ENIJA was developed to search for the prebiotic molecules and biogenic key compounds like amino acids in the plumes of Saturn's moon Enceladus. ENIJA records time-of-flight mass spectra in the range between 1 and 2000 u produced by high-velocity impacts of individual grains onto a metal target. The spectrometer has a measurement mode for cations or anions formed upon impact, with concurrent determination of the mass of the detected grains. Detection of elemental and molecular species over such a wide mass range permits clear characterization of particle chemistry, simultaneously covering individual ions like H⁺, C⁻, O⁻ and complex organics with masses of many hundred u. ENIJA is sensitive to water ice, minerals, metals, organic particles, and mixtures of these components. The instrument is based on the principle of impact ionization and optimized for the analysis of high dust fluxes and number densities as typically occur during Enceladus plume crossings or in cometary comae. The mass resolution is $m/dm > 950$ for typical plume particles in the size range 0.01 to 100 μm . The instrument mass and peak power is 2.5 kg and 12.5 W, respectively.