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# SOLID (Signs Of LIfe Detector) concept instrument for detection of subsurface life on Mars: results from Rio Tinto, Atacama and Antarctic permafrost terrestrial analogs.

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We have designed and built a series of instruments called SOLID ("Signs Of LIfe Detector", based on antibody microarray and lab on-a-chip technologies, devoted to automatic in situ analysis and detection-identification of microbial remains, or other substances and analytes. Current version, SOLID V3.0 (1), with a TRL level 5-6, is able to perform both sandwich and competitive immunoassays. It consists of two separate functional units: a Sample Preparation Unit (SPU), for ten different extractions by ultrasonication, and a Sample Analysis Unit (SAU), for several fluorescent immunoassays. The SAU (1 kg) consists of a microfluidic module five different flow cells, each one containing an LDChip400 antibody microarray (with more than 400 antigen-antibody reactions for specific Mars-relevant molecular biomarkers). An exclusively designed optical package coupled to a portable CCD device allows near-real time fluorescent detection.
We will show the already extensive and published results we have generate supporting the used of instrumentation based on antibody microarray technology for planetary exploration. For example, the long period storage and resistance of antibodies and fluorochomes to several space conditions (2) (low energy gamma radiation, high energy proton radiation, sudden temperature shifts, etc), the reliability and robustness of our LDChip (200-400) and SOLID2-3 in the detection of subsurface life and biomarkers in field campaigns in Río Tinto (3), Atacama Desert (4) and the Deception Island permafrost (Antarctica). Altogether, allow us to confirm the maturity of our SOLID technology for near future astrobiological missions to Mars.

1- Parro et al., 2011, Astrobiology 11(1):15-28
2- De Diego-Castilla et al., 2011, Astrobiology 11(8):759-73
3- Parro et al., 2011, Astrobiology 11(1):29-44
4- Parro et al., 2011, Astrobiology 11(10):969-96