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Survival of antibody assay reagents and materials under space mission conditions as a prelude to Life detection on Mars: Flight of the Life Marker Chip components on the ESA Biopan-6 platform

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Antibody microarray technology has been identified as a potential method for Life detection as part of the European Space Agency's ExoMars mission to Mars. The antibody microarray based Life Marker Chip (LMC) experiment, which will house a number of antibody microarrays each designed to detect multiple molecular targets relevant to Life detection on Mars, has been proposed as part of this mission. To understand the survivability under real space mission conditions of the chemical and biochemical reagents required for the LMC, representative components of the LMC were launched from Baikonur in September 2007 within the Biopan-6 space exposure platform aboard the Foton-M3 spacecraft. During the 12-day mission, Foton underwent over 180 low-Earth orbits at an altitude of 260-305 km, and for 10 days Biopan was opened to directly expose the LMC components to the radiation conditions of space. We tested the ability of three types of shielding - 'Infinite' (4mm aluminum + 2mm stainless steel), 'ExoMars equivalent' (4mm aluminum) and 'Zero shielding' (Kapton foil) - to protect the integrity of various LMC components during the spaceflight. The

components consisted of five types of assay reagents dried into a total of forty five glass fibre pads and twenty silicon or glass substrate microarrays each containing one hundred spot arrays of various assay reagents. Upon retrieval of the samples after return to Earth, a program of testing is currently underway to assess the survivability of the various samples and in comparison with various control samples. Information gained from this study will be used to guide the selection and development of the components to be used within the LMC experiment proposed for the ExoMars mission. The latest findings of the survivability of the antibody assay reagents will be reported.