



## **Alternative concepts for the handling of hazardous, liquid media in biological experiments**

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Hazardous liquids are not only subject of spacecraft processing. Also for Life Sciences experiments on the ISS this challenge is a typical task.

Astrium is currently developing an analyser for biological samples to provide real-time state-of-the-art analysis on board of the ISS. This system is comparable to a clinical laboratory, beside the fact that it has a size of about two shoe boxes.

The analysis is primarily based on the processing of commercial immuno assays on-board the ISS. Such assays use typically 4 to 7 different reagent- and support-solutions. The analyser is designed as an open system to enable the implementation of new assays in the future. Therefore the system design has also to consider the handling of hazardous liquids, which may be part of future assays. As they are processed in manned missions, the system requires the provision of 3 levels of containment. The sample concentrations go down into the sub-pikomolar range and the sample volume is only few  $\mu\text{l}$ . The intensity levels of the fluorescence signals are very low and an optical measurement through many containment levels is counter productive.

Two different designs alternatives have been developed:

- One concept is a closed system with 8 parallel channels. It makes use of one multi-compartment syringe per channel to store all required media in sequence and provides permanently three levels of containment.
- The second concept is loaded with dedicated cassettes for the media-/waste-storage and the measurement cassette. The liquid handling is mechanically performed by multiplexing. During the assay processing three levels of containment are only temporarily provided. Additionally a verification strategy, based on the measurement of an assay inherent fluorescence tracer is used, to ensure positively that after the processing the hazardous liquids have been completely removed and that the measurement cassette, providing now only one level of containment, can be handled safely by the crew.

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