

## An On-Chip Nano-Plasmonics Based Urine Protein Assay Cartridge

T3.02 Bio-Technology and Life Support

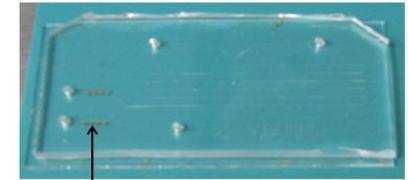
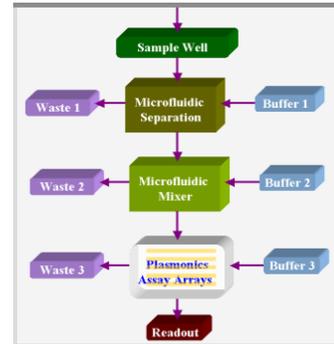
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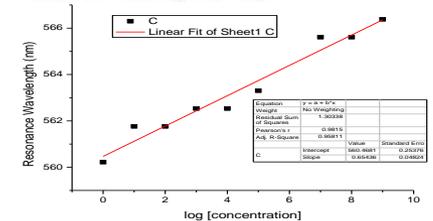
### Identification and Significance of Innovation

- Rapid assessment of astronaut basic health, in particular urinalysis or blood analysis, is a challenging problem
- Ground-based devices are bulky and less amenable to space operation
- Need leveraged and synergized harnessing of technological advancements in novel optics, microfluidics and lab-on-chip assay to engineer a solution

Expected TRL Range at the end of Contract (4-5):



600 μm x 600 μm gold micropads



### Technical Objectives and Work Plan

#### Objectives

Develop microfluidics-based automated method for blood/urinary proteome analysis

- Sample of microliter (urine)
- On-chip sample preparation and pretreatment
- Real-time analysis

On-Chip nanostructured plasmonic assay for health monitoring

- A transmission-mode SPR sensing
- A metal nanoplasmonic supports guided modes
- Fractional and microgravity compatible design
- Compatible to miniaturization and integration.

#### Work Plan

- Further optimization of nanoplasmonic chip modules
- Alleviation of nonspecific protein binding in chip
- On-chip integration of assay modules
- Biocompatibility testing and bubble mitigation
- System integration and prototype testing
- Correlation with ground-measurements

### NASA Applications

- Monitor astronaut health and develop preventive countermeasures against adverse health effects in space environment
- Monitor small-animal model health to gain better understanding of health-effects in space environment

### Non-NASA Applications

- Drop-of-care diagnostics
- Biomedical/Healthcare R&D
- clinical and preclinical diagnosis

### Firm Contacts

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