

A close-up photograph of a person wearing blue nitrile gloves. The person is holding a test tube with a green cap and a pipette tip. The background is blurred, showing the person's face and a lab coat.

Sample Preparation

Project group

Sample preparation is a crucial aspect in many areas of bioanalytical research, especially in the analysis of the crude complex samples and / or rare targets. Modern laboratories exploit very sensitive methods of detection including molecular diagnostics; however, their performance strongly depends on the quality of the sample. Pre-analytical processing must prepare the specimen for the most effective detection of the target. It can include purification of the analyte, its pre-concentration, as well as parallel removal of the compounds which may affect the analysis. Preservation of samples which prevents degradation of the target is also a task for this field of applied analytics. The main aim of sample preparation is to ensure the precision of the subsequent analysis. None of the sample preparation approaches are universal: They must take into account

methods and equipment for the downstream processing of the specimen, concentration and nature of the analyte, volume of the sample and many other factors.

Nowadays bioanalytical research actively pursues integration of the complex assays on the automated platforms including lab-on-chip devices. This trend often lacks intelligent solutions for the pre-analytical steps. The aim of our project group is to support this particular field by the development of the most suitable sample preparation approaches for any specific needs.

The group supports researchers and industrial partners with custom solutions, evaluates capacities of existing methods and works on the development of novel strategies for the effective pre-analytical processing.

We work to support our current and future partners from industry and academia in the following tasks

- Target isolation, pre-concentration and purification (cells, molecules, particular sample fractions)
- Cell lysis techniques for various applications
- Strategies for rare targets
- Analytical compatibility of sample preparation with custom downstream processes
- Approaches for technical integration of sample preparation with custom systems and setups including microfluidic devices
- Routine and point-of-care solutions for sample preparation
- Recommendations for sample collection and preservation

Our former and ongoing projects cover the following topics

- Isolation of sepsis-related pathogens from blood for molecular diagnostics of bloodstream infections
- Isolation of *Chlamydia trachomatis* from urine for homecare diagnostics
- Isolation of mycobacteria from sputum
- Preparation of subgingival plaque samples for point-of-care molecular diagnostics of parodontitis
- Preparation of nasopharyngeal swabs for point-of-care detection of methicillin-resistant *Staphylococcus aureus*

We work in close collaboration with specialists in relevant clinical and engineering fields in order to develop an optimal sample preparation approach for a particular application.

Contact

Dr. Natalia Sandetskaya
Department of Diagnostics
MicroDiagnostics Unit
Tel. +49 341 35536-9310
natalia.sandetskaya@
izi.fraunhofer.de

Fraunhofer Institute
for Cell Therapy and
Immunology
Perlickstraße 1
04103 Leipzig
Germany
www.izi.fraunhofer.de