» Forschung in Wildau – innovativ und praxisnah «

Development of an universal blood collecting system
Conception phase

Susanne, Schlegel[1, a]; Franziska, Glös[1,b]; Marilena, Minieri[2,c]
and Andreas H. Foitzik[1,d]

[1] University of Applied Science Wildau, Department of Engineering and Natural Sciences, 15745 Wildau, Germany
[2] University of Rome Tor Vergata, Department of Industrial Engineering, Via Orazio Raimondo, 18 - 00173 Roma, Italy
[a]susanne.schlegel@th-wildau.de, [b]franziska.gloes@th-wildau.de, [c]minieri@med.uniroma2.it, [d]afoitzik@th-wildau.de

Intruduction

Fig. 1: Side view of possible appearance of a prospective an universal blood collecting system with integrated analytics

The **sample preparation** for biological and chemical probes involves following a **strict workflow** to eliminate any contamination of the sample beforehand. Furthermore, it is **time consuming** and must be carried out by **trained personnel** such as a nurse or other supervisors, increasing the price per sample. The development of novel sample preparation techniques paired with modern sample analysis systems is focused on improving the operability while keeping a constant quality of results.

Requirements of the new MAS for medical-applications

The **MAS** should be an **all-in-one device** which directly combine the blood sampling and medical analysation. For that the analytical device should be a commercially available lateral flow assay (LFA). Therefore, a universal as well as **sturdy housing** will be designed which **contains all functional compartments**. A needle system extracts the blood from the patient, while capillary forces transfer the sample through internal feeding into a reservoir. Afterwards, a buffer flushes the reservoir and shuttle the analyte onto the migration distance to the test row. This way, the MAS **combines the blood sampling, sample preparation** and **analysis**.

The requirements of each step of the work flow is shown in fig. 2. Generally, the MAS should be **small in size** and **cost-efficient**. Furthermore, the operation procedure of the MAS should be **simple** and **intuitive**.

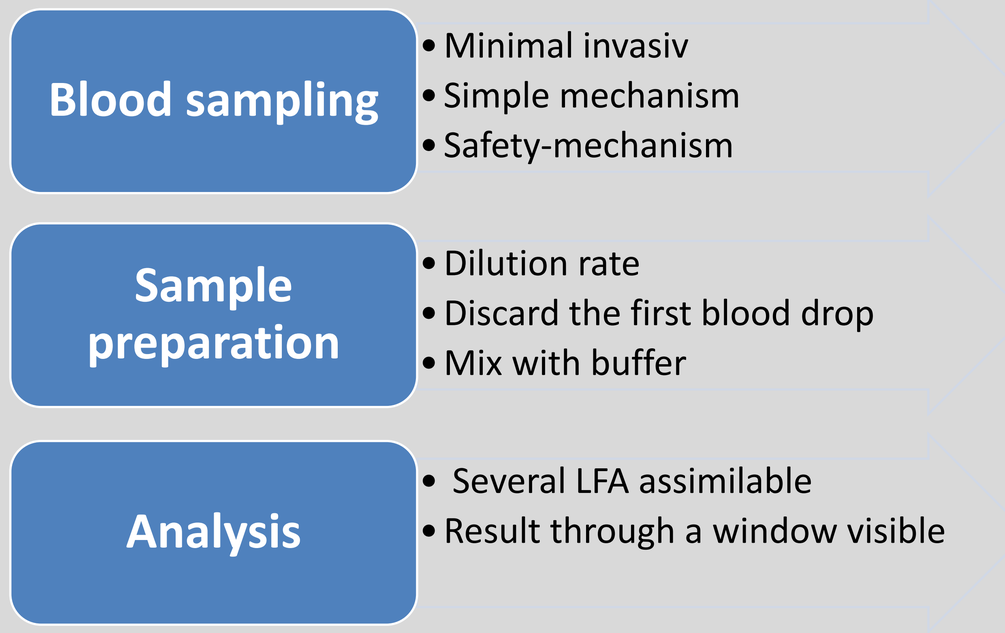

Fig. 2: Requirements for prospective MAS

Workflow of the new MAS for medical-applications

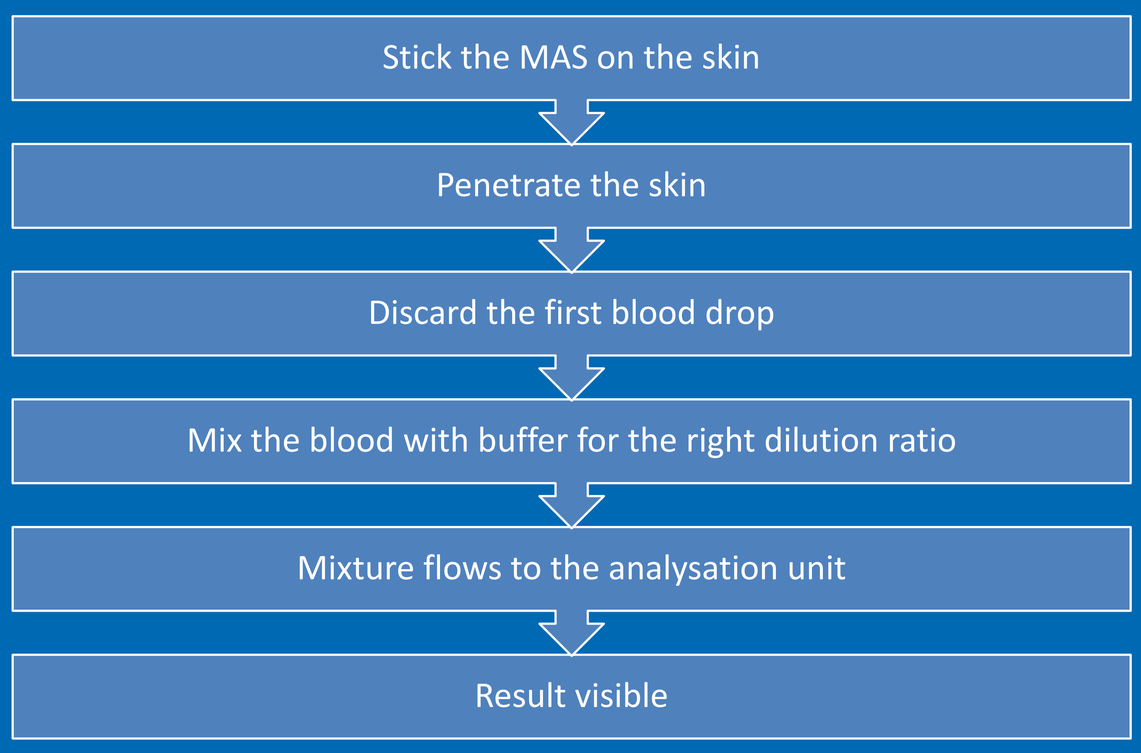

Fig. 3: Process flow diagram of the requirements for medical-applications

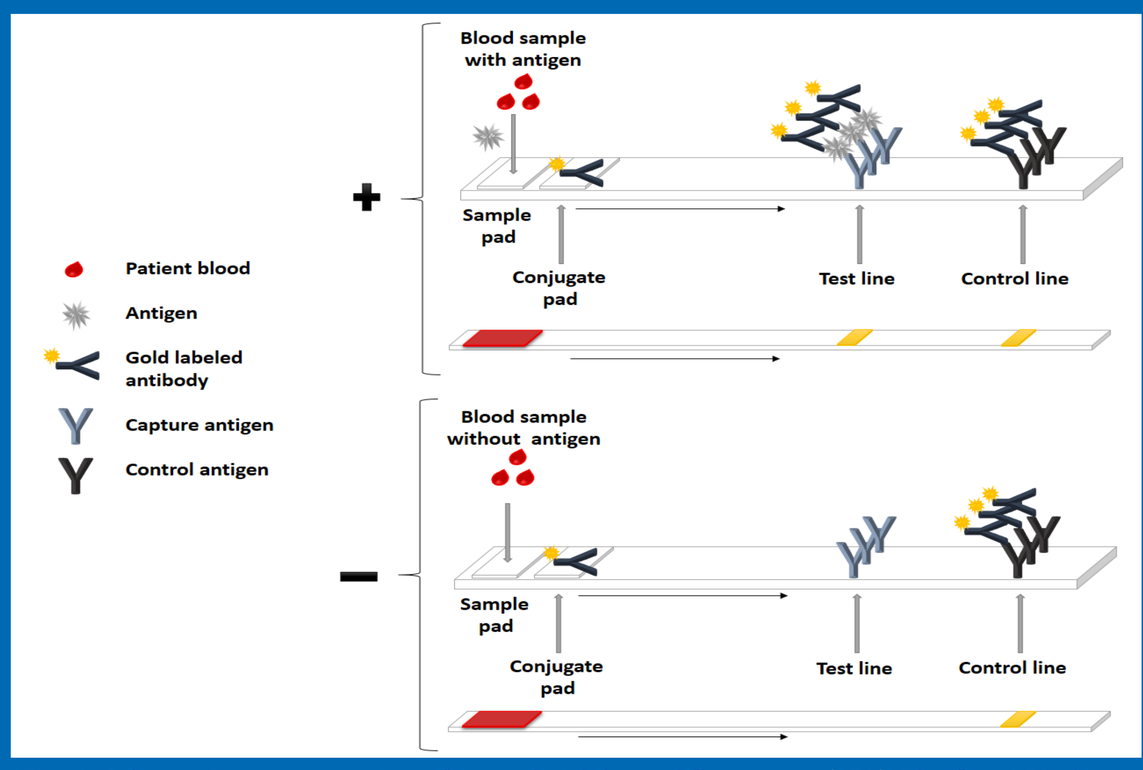

Fig. 4: Schematic representation of a sandwich lateral flow assay (LFA). The first LFA shows two lines (the test and the control line) and is positive (+). The second test shows only one line (the control line) and it is negative (-).

Conclusion

The requirements of a prospective MAS are set. The new MAS will be cost-efficient as well as being small in size to reduce the haulage. Furthermore, medical staff is not necessary anymore to carry out the analysis and medical evidence. Due to simpler and faster MAS, a high number of patients could be tested in a much shorter period of time, which enables the identification of epidemics in an early stage. The aim of the ongoing work now is to develop the realization strategy to unify all parts in the presented device.

Homepage:
www.th-wildau.de/mst

Arbeitsgruppe: Mikrosystemtechnik und Systemintegration
Projektleiter / Professor: Prof. Dr. rer. nat. Andreas H. Foitzik

Telefon: +49 (0) 3375 / 508 785
E-Mail: E-Mail susanne.schlegel@th-wildau.de