Trypanosomes and their bloody matrix: microfluidic separation approaches

Humans and animals alike suffer from diseases caused by African trypanosomes. These protozoan parasites dwell in their hosts' adipose tissue and body fluids. Trypanosomes propel themselves using a single, mostly sheathed flagellum, which also plays key roles in immuno-evasion and differentiation throughout their life cycle.
Diagnosis of human African Trypanosomiasis (HAT) requires the positive identification of *Trypanosoma brucei spp.* in the bloodstream, which can be very challenging with samples of low parasitaemia, as for example in peripheral blood samples. Therefore, separating trypanosomes from other cells in their matrix (especially red blood cells) can be of pivotal importance for successful diagnosis of HAT.

By increasing our knowledge on physicochemical properties of trypanosomes – and their importance for pathogenicity – we can adapt more and more microfluidic-based approaches to isolate the parasitic flagellates from red blood cells or other particles.

Recent advances in interdisciplinary research have led to multiple microfluidics-based approaches – i.e. Dielectrophoresis, deterministic lateral displacement, and optical traps – to separate trypanosomes from (artificially) infected blood samples and to isolate single trypanosomes for analyses including drug screening.