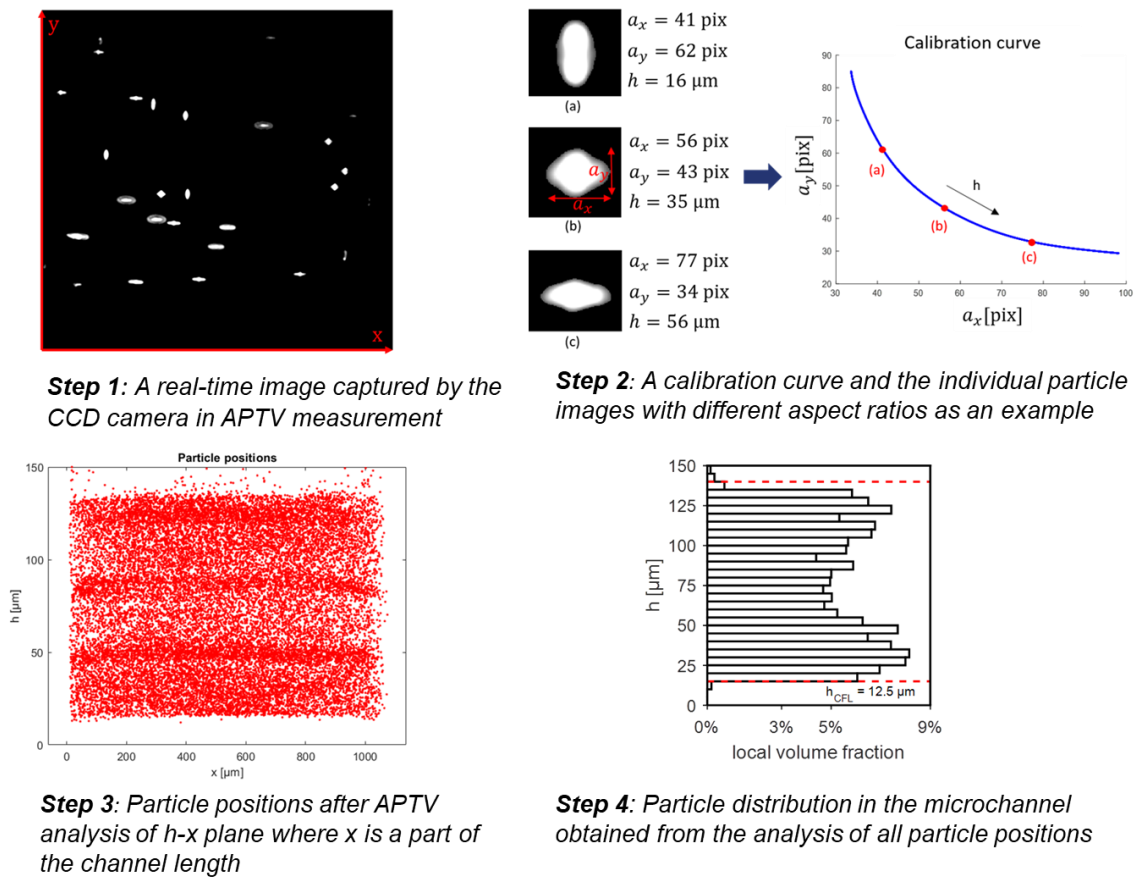


## Supplementary Materials

Figure S1 shows the processing steps to determine the local particle distribution, which is visualized in Figure 9 in the manuscript. APTV is a single-camera technique allowing to extend a planar image-based 2D-PTV approach to a 3D tracking approach with the help of astigmatic particle images. In the first step, a real-time image is recorded with the CCD camera from the top view. Using a pre-defined calibration curve, an exact height position in the microchannel ( $h$ -position) can be determined depending on the fluorescence of each particle. After this step, the counted particles can be positioned in the channel (Step 3). In a further processing step, the local particle distribution can be determined for all the particles at the respective height.



**Figure S1.** Visualization of the single steps for the analysis of the local particle distribution in the microchannel by APTV.