Measuring density and compressibility of white blood cells and prostate cancer cells by microchannel acoustophoresis

We present a novel method for the determination of density and compressibility of individual particles and cells undergoing microchannel acoustophoresis in an arbitrary 2D acoustic field. Our method is a critical advancement within acoustophoretic separation of biological cells, as the ability to determine the density and compressibility of individual cells enables the prediction and alteration of the separation outcome for a given cell mixture. We apply the method on white blood cells (WBCs) and DU145 prostate cancer cells (DUCs) aiming to improve isolation of circulating tumor cells from blood, an emerging tool in the monitoring and characterizing of metastatic cancer.