Abstract Submitted
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Nanoscale lateral displacement arrays for the separation of exosomes and colloids down to 20nm ROBERT AUSTIN, Princeton University, BENJAMIN WUNSCH, JOSHUA SMITH, STACEY GIFFORD, IBM T.J. Watson Research Center, CHAO WANG, Arizona State University, MARKUS BRINK, ROBERT BRUCE, GUSTAVO STOLOVITZKY, IBM T.J. Watson Research Center, YANN ASTIER, Arizona State University — Deterministic lateral displacement (DLD) pillar arrays are an efficient technology to sort, separate and enrich micrometre-scale particles, which include parasites1, bacteria2, blood cells3 and circulating tumour cells in blood4. However, this technology has not been translated to the true nanoscale, where it could function on biocolloids, such as exosomes. Exosomes, a key target of liquid biopsies, are secreted by cells and contain nucleic acid and protein information about their originating tissue5. One challenge in the study of exosome biology is to sort exosomes by size and surface markers6, 7. We use manufacturable silicon processes to produce nanoscale DLD (nano-DLD) arrays of uniform gap sizes ranging from 25 to 235nm. We show that at low Pclet (Pe) numbers, at which diffusion and deterministic displacement compete, nano-DLD arrays separate particles between 20 to 110nm based on size with sharp resolution. Further, we demonstrate the size-based displacement of exosomes, and so open up the potential for on-chip sorting and quantification of these important biocolloids.

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