

Smarter cell sorting: droplet microfluidics meets pick-and-place sorting¹



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CONCEPT

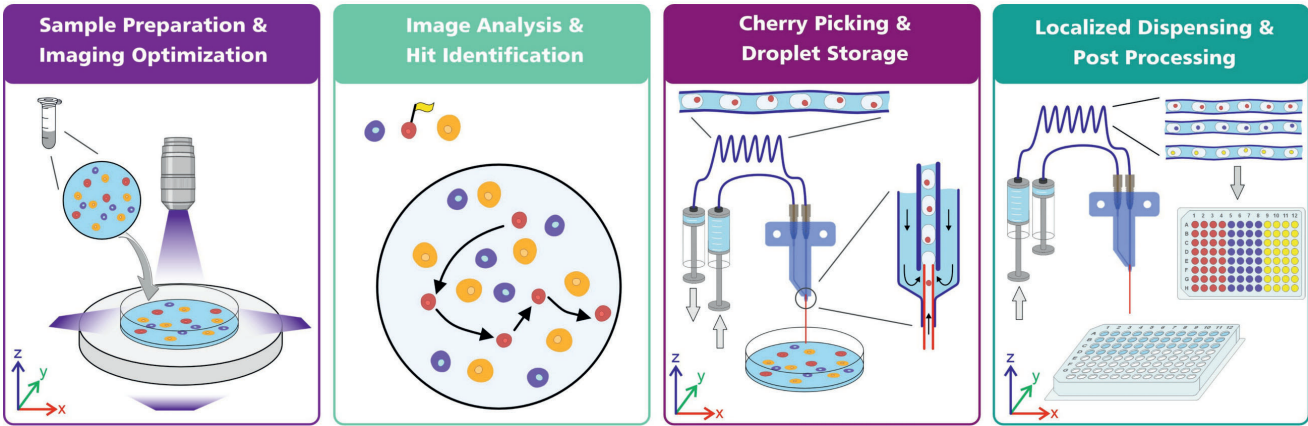
Image-based target selection · Individual object picking · Intermediate storage in droplet sequence · Individual droplet dispensing with spacial resolution

~20×

Performance improvment²

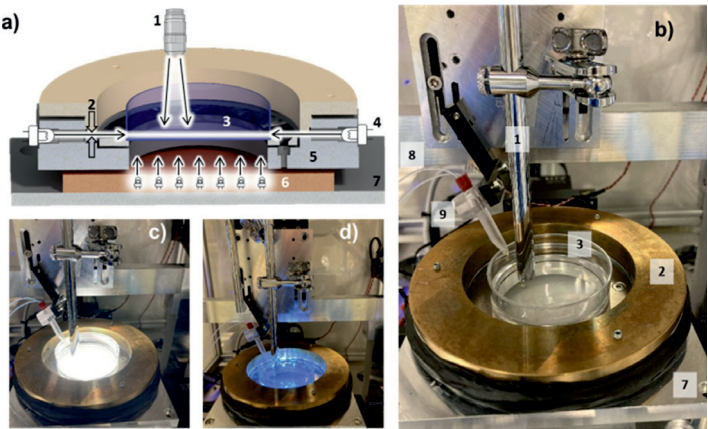
WORKFLOW AND AUTOMATION

01. PICK-AND-PLACE WORKFLOW FOR MICROSCOPIC OBJECTS



1) Sample preparation, 2) Image analysis, 3) Serial object pickup & intermediate droplet storage and 4) Localized dispensing.

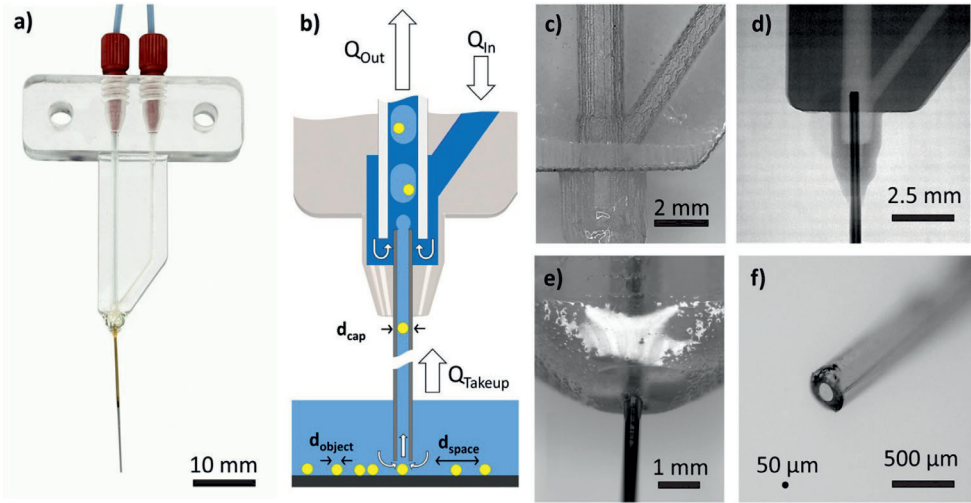
02. ILLUMINATION AND IMAGING SETUP



Microscopic object recognition requires dedicated lighting options.¹

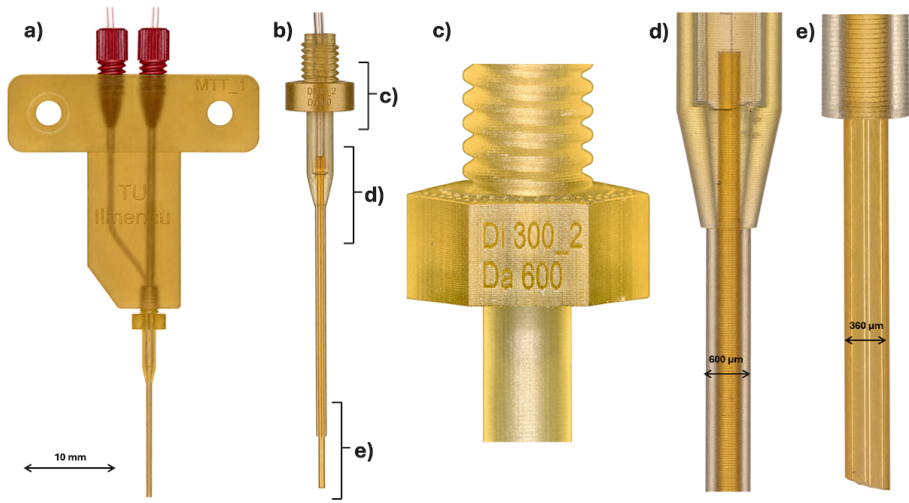
MICROFLUIDIC TRANSFER TOOL - MTT

03. LAYOUT AND OPERATIONAL PRINCIPLE



The MTT tip individually aspirates and embed submerged objects in droplets. Droplets are formed and stored inside the MTT's PTFE-tubing.¹

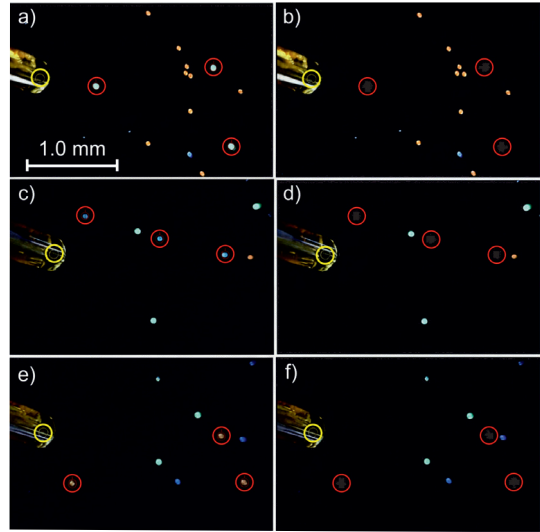
04. REPLACEABLE PICKING NEEDLE



The capillary dimension must be adjusted to the desired size of the object for high picking accuracy. The two-piece MTT variant enables easy and fast replacement of the interchangeable capillary holder.

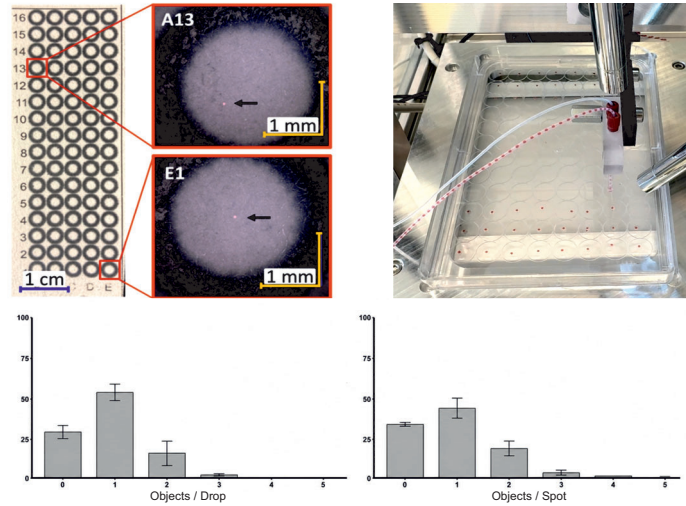
PERFORMANCE & APPLICATIONS

05. SIZE & COLOR SELECTIVE PICKUP



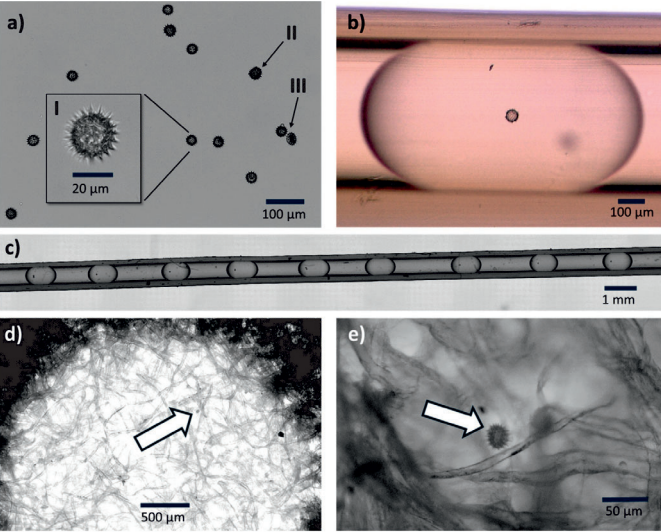
Fluorescent polymeric beads were selected by size & spectral properties and translocated into 96-well MTP.

06. OBJECT PLACEMENT EXAMPLES



Selected polymeric beads placed on wicking surface and 96-well MTP. Exemplary single-out performance for size-selective transfer.

07. MORPHOLOGY BASED SELECTION



Hydrated sunflower pollen, ~20 µm were selected by morphologic criteria, captured in droplets & placed on wicking surface

²Time comparison: ~300 objects in ~5 min versus ~100 min at ~20 s per individual transfer from source to target. Benchmarking on polymeric beads ~40 - 80 µm. Performance depends on desired selection criteria, objects and conditions.

¹Gerhard et al., Lab on a Chip 26 (2026), 2684–2696. DOI: 10.1039/D5LC00550G · PCT WO2022219116A1

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