Supplementary Material (ESI) for Lab on a Chip

A membrane-based, high-efficiency, microfluidic debubbler – Supplemental Information

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Movie S1: A video showing the debubbler removing an airbubble from a stream of DI water.

Movie S2: A video showing the debubbler removing an airbubble from a stream of PBS buffer.

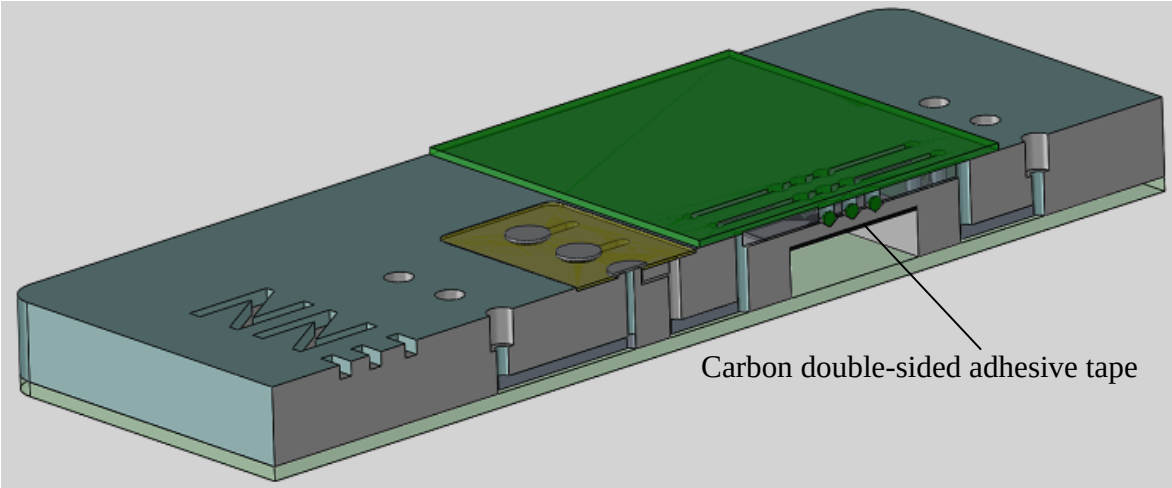

Fig. S1: Cross-sectional view of the assembled microfluidic cassette.

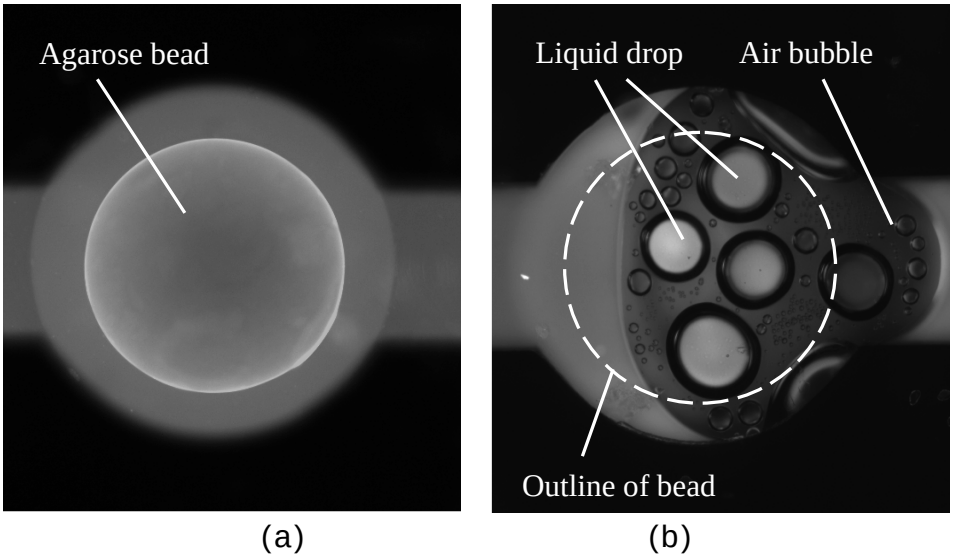

Fig. S2: (**a**) Fluorescent image of an agarose bead in a microfluidic cassette integrated with a debubbler. No observable air bubble was trapped in the bead well. (**b**) Fluorescent image of an agarose bead in a microfluidic cassette without a debubbler. Air bubbles trapped in the bead well disturb DNA detection and subsequent fluorescent imaging. In contrast to the degassed case (a), the bead (outlined with a dashed line) is barely visible.

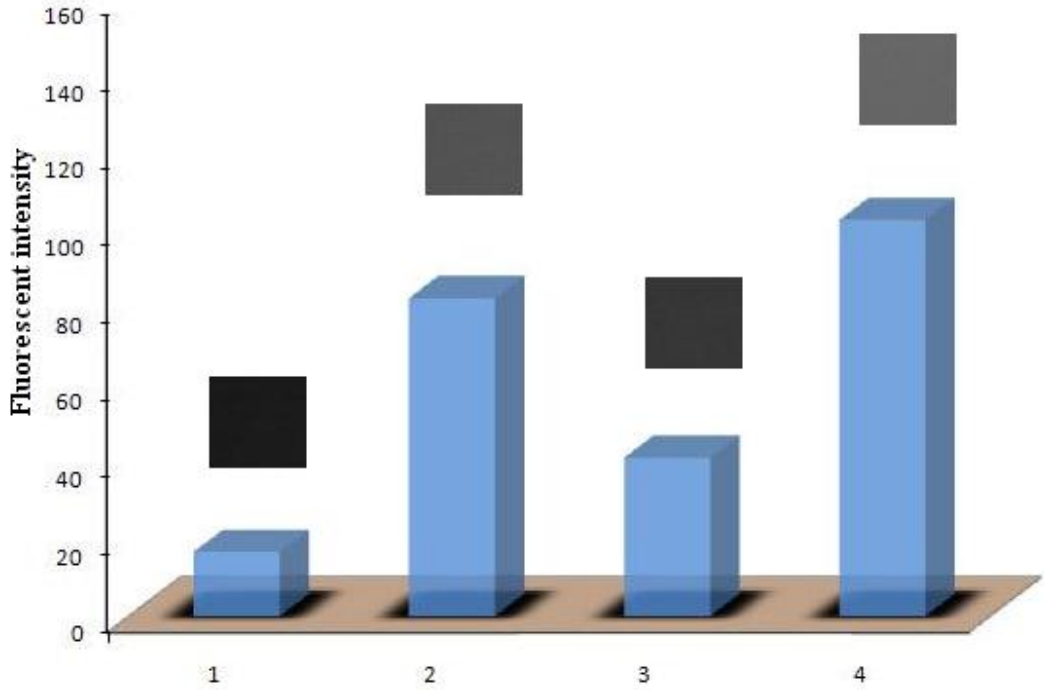

Fig. S3: Background fluorescent intensity as a function of the substrate material. (1) 0.8 mm-thick PMMA substrate with black tape; (2) 0.8 mm-thick PMMA substrate without tape; (3) 3 mm-thick PMMA substrate with black tape; and (4) 3 mm-thick PMMA substrate without tape. The photograph above the top of each column is a fluorescent image of the corresponding substrate material.

Fig. S3 depicts the background fluorescent intensity (in arbitrary units) as a function of the thickness of the PMMA substrate in the absence and presence of a carbon tape. The figure demonstrates that the background fluorescence can be dramatically decreased by reducing the PMMA substrate thickness and by attaching a carbon black tape to the back of the substrate. The squares above the bars in the figure are samples of the signal detected with the camera at each case.

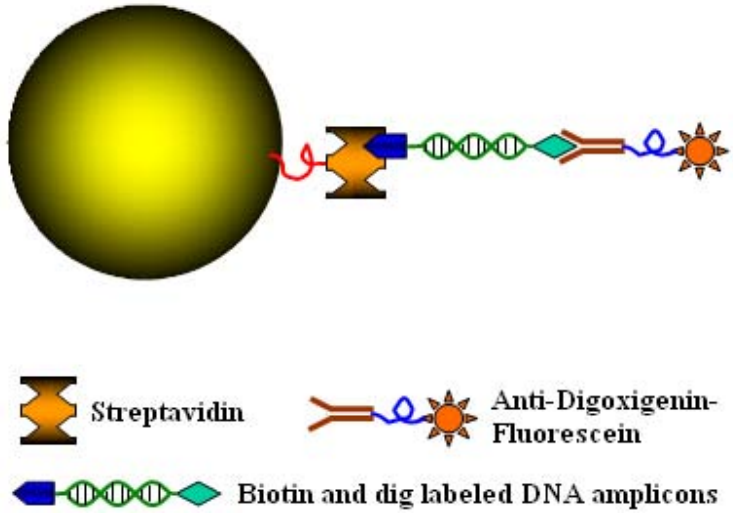

Fig. S4 A schematic depiction of the streptavidin-coated agarose bead-based assay. Biotin and dig labeled DNA amplicon first bind to the streptavidin-coated agarose bead through their biotin functionalization. Then, the anti-digoxigenin-fluorescein complex binds to the dig end of the DNA amplicon.