Paper title: A planar surface acoustic wave micropump for closed-loop microfluidics

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Preamble:
The paper concerns the integration of a Rayleigh-surface acoustic wave micropump with a planar, closed-loop microfluidic channel. The channel comprises vertical sections which increase the coupling efficiency from the RSAW mechanical wave into pressure waves within the confined fluid, by exploiting the Rayleigh scattering angle of the SAW on contact with said fluid. This simple arrangement increases the power efficiency of the micropump by an order of magnitude (and beyond at lower drive powers), making it ideal for use in point-of-care devices which require closed-loop systems in order to minimise routes of contamination.

Dataset filename: Data_for_Fig_2a_and_2b.xlsx

This dataset contains all values and appropriate equations required to calculate the data used to compose Figures 2a and 2b, specifically:

- The RSAW coupling efficiency into an overlaid fluid (water, in this case) as a function of RSAW wavelength (Fig 2a).
- The unloaded and loaded (with PDMS) scattering transmission parameters S12, alongside the relative transducer efficiency, as a function of RSAW wavelength (Fig 2b).

Dataset filename: Data_for_Fig_3_and_Fig_4.xlsx

This dataset contains all values and appropriate equations required to calculate the data used to compose Figures 3 and 4, specifically:

- The pressure gradient, G (kPa/m) generated within our microfluidic channel as a function of RSAW wavelength and applied power (Fig 3). All data required for the inset is present.
- The power efficiency, defined as the power delivered to the fluid divided by the power applied to the device, for the best measured RSAW devices (with operating wavelengths of 40 µm, 50 µm and 60 µm) in comparison with the best RSAW micropumps reported to date (Fig 4).

Dataset filename: Data_for_supplementary_Fig_S1.xlsx

This dataset contains the averaged velocity data, measured using motion tracking of ~ 1000, 2-µm-diameter latex beads per data point, used to generate the flow profiles presented in supplementary figure S1. Standard deviations of the averaging process are given as errors on the relevant values.

Dataset filenames:
125um-32MHz.zip
100um-40MHz.zip
80um-50MHz.zip
70um-57MHz.zip
60um-66MHz.zip
50um-80MHz.zip
40um-100MHz.zip
30um-133MHz.zip

This final datasets contain all video footage used to perform particle tracking measurements from which fluid flow velocities and flow profiles were extracted. Owing to the number of files, they have been grouped by RSAW wavelength into separate .zip files. Within each .zip file, the file/folder structure is as detailed on the following pages. The channel fluid used for each measurement (which therefore determines what fluid viscosity was used in calculations) is identified for each file.

Device wavelength (µm)	Applied power (W)	Filename	File path	Channel fluid
125 um – 32 MHz.zip				
125	0.125	32_21dbm_1.mov 32_21dbm_2.mov 32_21dbm_3.mov 32_21dbm_4.mov	/125um-32MHZ/0_125W	Water
	0.25	32_24dbm_1.mov 32_24dbm_2.mov 32_24dbm_3.mov 32_24dbm_4.mov	/125um-32MHZ/0_25W	Water
	0.5	32_27dbm_1.mov 32_27dbm_2.mov 32_27dbm_3.mov 32_27dbm_4.mov	/125um-32MHZ/0_5W	Water
	0.75	32_28.7dbm_1.mov 32_28.7dbm_2.mov 32_28.7dbm_3.mov 32_28.7dbm_4.mov	/125um-32MHZ/0_75W	Water
	1	32_30dbm_1.mov 32_30dbm_2.mov	/125um-32MHZ/1_0W	Water
100 um - 40 MHz.zip				
100	0.125	40_21dbm_1.mov 40_21dbm_2.mov 40_21dbm_3.mov 40_21dbm_4.mov	/100um-40MHZ/0_125W	Water
	0.25	40_24dbm_1.mov 40_24dbm_2.mov 40_24dbm_3.mov 40_24dbm_4.mov	/100um-40MHZ/0_25W	Water
	0.5	40_27dbm_1.mov 40_27dbm_2.mov 40_27dbm_3.mov 40_27dbm_4.mov	/100um-40MHZ/0_5W	Water
	0.75	40_28.7dbm_1.mov 40_28.7dbm_2.mov 40_28.7dbm_3.mov 40_28.7dbm_4.mov	/100um-40MHZ/0_75W	Water
	1	40_30dbm_1.mov 40_30dbm_2.mov 40_30dbm_3.mov 40_30dbm_4.mov	/100um-40MHZ/1_0W	Water
80 um - 50 MHz.zip				
80	0.125	50_21dbm_1.mov 50_21dbm_2.mov 50_21dbm_3.mov 50_21dbm_4.mov	/80um-50MHZ/0_125W	Water

	0.25	50_24dbm_1.mov 50_24dbm_2.mov 50_24dbm_3.mov 50_24dbm_4.mov	/80um-50MHZ/0_25W	Water
	0.5	50_27dbm_1.mov 50_27dbm_2.mov 50_27dbm_3.mov 50_27dbm_4.mov	/80um-50MHZ/0_5W	Water
	0.75	50_28.75dbm_1.mov 50_28.75dbm_2.mov 50_28.75dbm_3.mov 50_28.75dbm_4.mov	/80um-50MHZ/0_75W	Water
	1	50_30dbm_1.mov 50_30dbm_2.mov 50_30dbm_3.mov 50_30dbm_4.mov	/80um-50MHZ/1_0W	Water
70 um - 57 MHz.zip				
70	**0.125**	57MHz_21dbm_1.mov 57MHz_21dbm_2.mov 57MHz_21dbm_3.mov 57MHz_21dbm_4.mov	/70um-57MHZ/0_125W	Glycol
	0.25	57MHz_24dbm_1.mov 57MHz_24dbm_2.mov 57MHz_24dbm_3.mov 57MHz_24dbm_4.mov	/70um-57MHZ/0_25W	Glycol
	0.5	57MHz_27dbm_1.mov 57MHz_27dbm_2.mov 57MHz_27dbm_3.mov 57MHz_27dbm_4.mov	/70um-57MHZ/0_5W	Glycol
	0.75	57MHz_28.7dbm_1.mov 57MHz_28.7dbm_2.mov 57MHz_28.7dbm_3.mov 57MHz_28.7dbm_4.mov	/70um-57MHZ/0_75W	Glycol
	1	57MHz_30dbm_1.mov 57MHz_30dbm_2.mov	/70um-57MHZ/1_0W	Glycol
60 um - 66 MHz.zip				
60	**0.125**	66MHz_21dbm_1.mov 66MHz_21dbm_2.mov 66MHz_21dbm_3.mov 66MHz_21dbm_4.mov	/60um-66MHZ/0_125W	Glycol
	0.25	66MHz_24dbm_1.mov 66MHz_24dbm_2.mov 66MHz_24dbm_3.mov 66MHz_24dbm_4.mov	/60um-66MHZ/0_25W	Glycol
	0.5	66MHz_27dbm_1.mov 66MHz_27dbm_2.mov 66MHz_27dbm_3.mov 66MHz_27dbm_4.mov	/60um-66MHZ/0_5W	Glycol

50 um - 80 MHz.zip				
50	**0.125**	80MHz_21dbm_1.mov 80MHz_21dbm_2.mov 80MHz_21dbm_3.mov 80MHz_21dbm_4.mov	/50um-80MHZ/0_125W	Glycol
	0.25	80MHz_24dbm_1.mov 80MHz_24dbm_2.mov 80MHz_24dbm_3.mov 80MHz_24dbm_4.mov	/50um-80MHZ/0_25W	Glycol
	0.5	80MHz_27dbm_1.mov 80MHz_27dbm_2.mov 80MHz_27dbm_3.mov 80MHz_27dbm_4.mov	/50um-80MHZ/0_5W	Glycol
40 um - 100 MHz.zip				
40	**0.125**	100MHz_21dbm_1.mov 100MHz_21dbm_2.mov 100MHz_21dbm_3.mov 100MHz_21dbm_4.mov	/40um-100MHZ/0_125W	Glycol
	0.25	100MHz_24dbm_1.mov 100MHz_24dbm_2.mov 100MHz_24dbm_3.mov 100MHz_24dbm_4.mov	/40um-100MHZ/0_25W	Glycol
	0.5	100MHz_27dbm_1.mov 100MHz_27dbm_2.mov 100MHz_27dbm_3.mov 100MHz_27dbm_4.mov	/40um-100MHZ/0_5W	Glycol
30 um - 133 MHz.zip				
30	**0.125**	133MHz_21dbm_1.mov 133MHz_21dbm_2.mov 133MHz_21dbm_3.mov 133MHz_21dbm_4.mov	/30um-133MHZ/0_125W	Glycol
	0.25	133MHz_24dbm_1.mov 133MHz_24dbm_2.mov 133MHz_24dbm_3.mov 133MHz_24dbm_4.mov	/30um-133MHZ/0_25W	Glycol
	0.5	133MHz_27dbm_1.mov 133MHz_27dbm_2.mov 133MHz_27dbm_3.mov 133MHz_27dbm_4.mov	/30um-133MHZ/0_5W	Glycol
	0.75	133MHz_28.7dbm_1.mov 133MHz_28.7dbm_2.mov 133MHz_28.7dbm_3.mov 133MHz_28.7dbm_4.mov	/30um-133MHZ/0_75W	Glycol
	1	133MHz_30dbm_1.mov 133MHz_30dbm_2.mov 133MHz_30dbm_3.mov 133MHz_30dbm_4.mov	/30um-133MHZ/1_0W	Glycol