Electronic Supplementary Information (ESI)

Wirelessly activated device with integrated ionic polymer metal composite (IPMC) cantilever valve for targeted drug delivery

CONTENTS

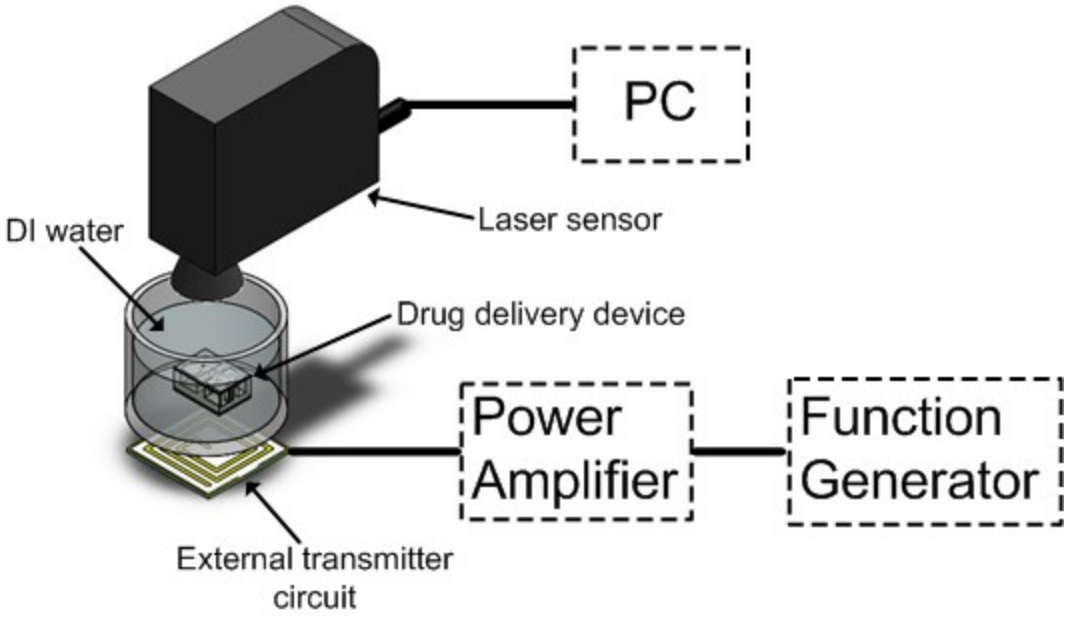

Fig. S1 Experimental setup for wireless RF controlled drug delivery device. The data acquisition system involved the laser sensor which was used to detect the deformation of the IPMC cantilever and a computer for data acquisition.

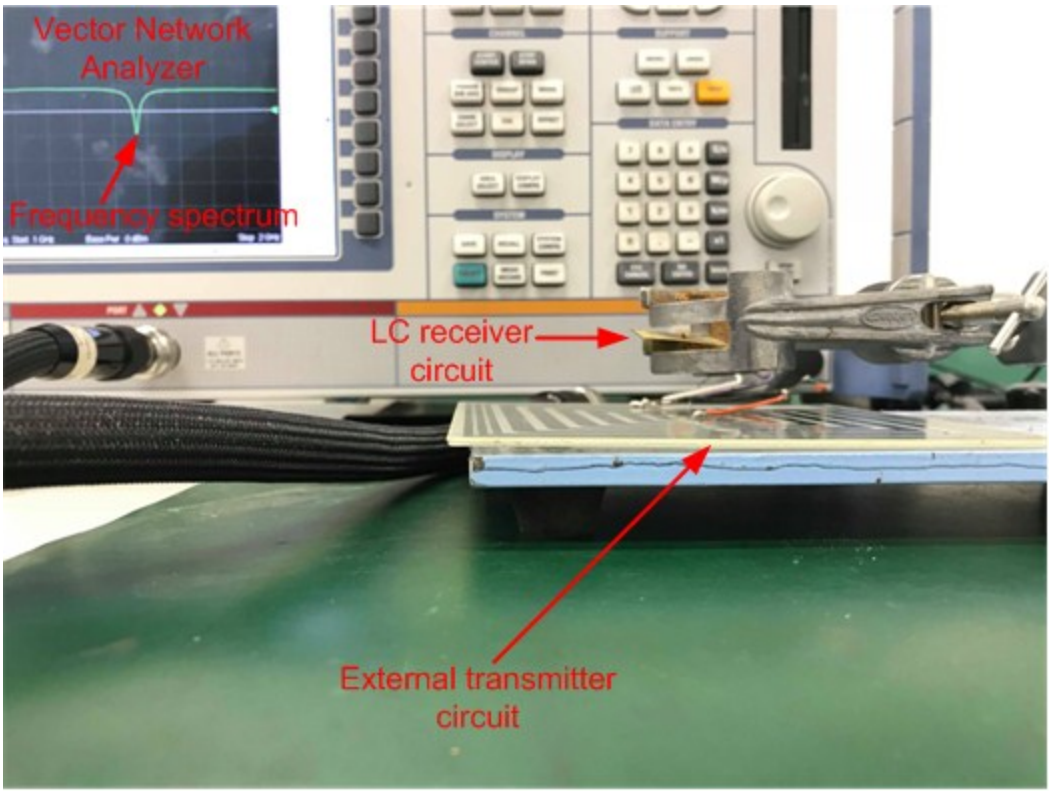

Fig. S2 Experimental setup for resonant frequency characterization using S_{11} parameter. The LC receiver circuit was connected to the vector network analyzer and wirelessly measured through inductive coupling with a LC transmitter circuit.

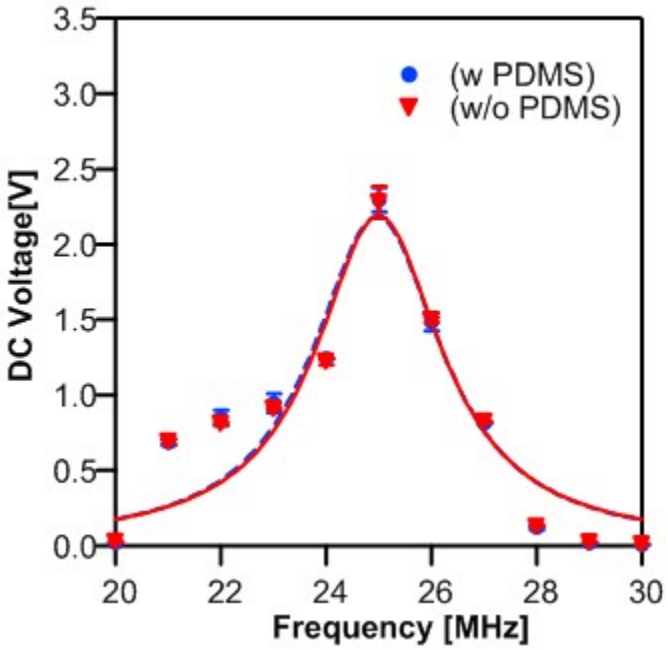

Fig. S3 DC voltage response of the LC receiver circuit (after fed to DC rectifier circuit) encapsulated with and without PDMS layer. Both devices exhibits same trend and poses the highest voltage response at ~25 MHz.

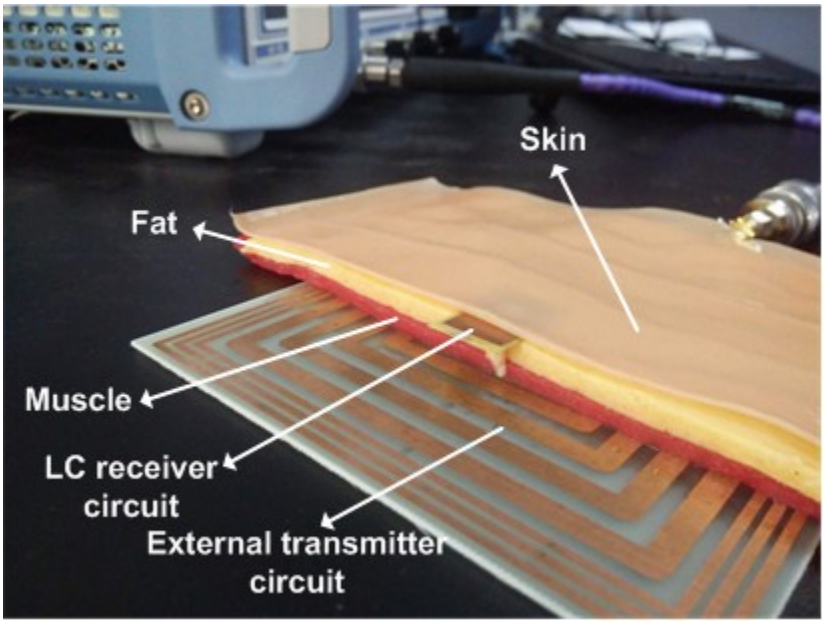

Fig. S4 Experimental setup for measuring S_{11} parameters of the LC receiver circuit in a skin mimicking gels (with and without muscle and fat gel models).

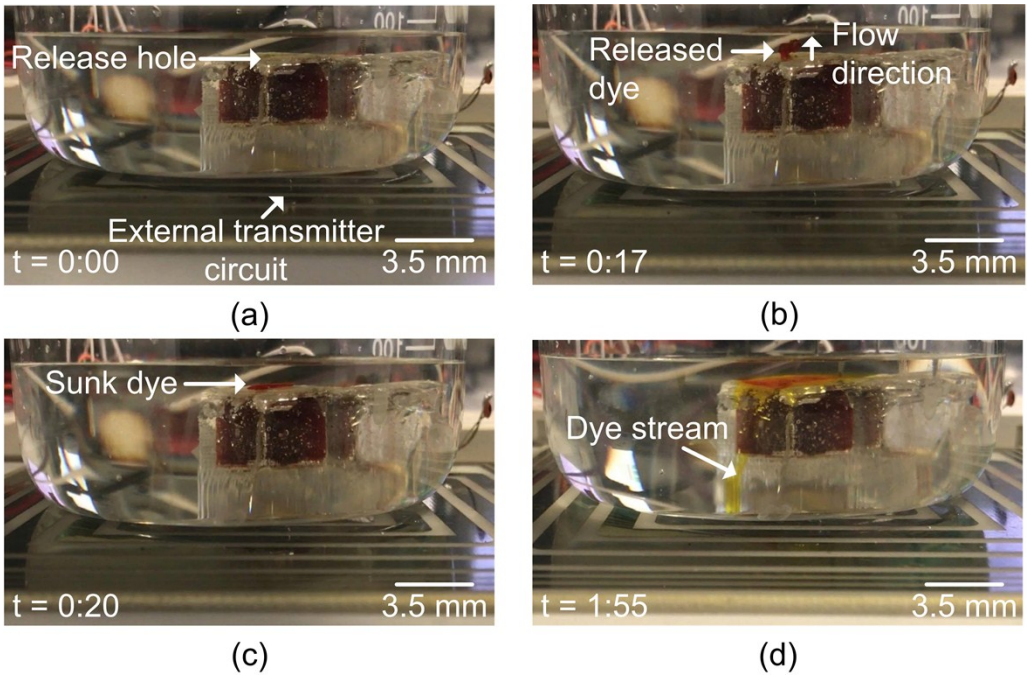

Fig. S5 Preliminary wireless release test of the drug delivery device preloaded with color dye. (a) the device shows no detachable release of dye when the wireless power is turned off, (b) the RF wireless is activated and released of color dye can be visually observed at the 17th second- a significant amount of dye release is initiated due to the pressure pushed by the IPMC cantilever, (c) the dye is then sunk and condensed at the released hole of the device at the 20th seconds in DI water, (d) when the time elapses, the released of dye continues and starts to diffuse to the environment.

TABLE S1: Comparison of total power consumption for wireless drug delivery actuation with that of other devices.

Author	**Actuator**	**Power Consumption/** (W)	**Flow Rate/** (μL/min)
Zainal et al.[31]	Shape Memory Polymer	5.000	0.172
Fong et al. [35]	Shape Memory Alloy	1.100	N/A
Ying Yi et al.[36]	Electrolytic	0.004	0.011
This Work	Ionic Polymer Metal Composite	0.400	3.6

References

31 M. Zainal, A. Ahmad and M. M. Ali, *Biomedical microdevices*, 2017, 19, 8.

35 J. Fong, Z. Xiao and K. Takahata, *Lab on a Chip*, 2015, 15, 1050-1058.

36 Y. Yi, U. Buttner and I. G. Foulds, *Lab on a Chip*, 2015, 15, 3540-3548.