Electronic Supplementary Material (ESI) for Nanoscale.

An integrated microfluidic electrochemical assay for cervical cancer detection at point-of-care testing

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Table S1. The sequence of nucleic acids used in this paper

Nucleic acid strand	**Sequence**
hr-HPV 16 cssDNA (Probe)	GGGCTCTGTCCGGTTCTGCTTGTCCA/3AmMO/
hr-HPV 16 cDNA (Target)	TGGACAAGCAGAACCGGACAGAGCCC
Cy3-rDNA	/5Cy3/GGTGGTGGGGGGGGTTGGTAGGGTGTCTTC

Table 2. Recent studies of hr-HPV DNA detection

Reference	**Working electrode**	**Electrochemical technique**	**Medium**	**Target**	**LOD**
Ref[1]	Polypyrrole (PPy) films and gold nanoparticles (AuNPs)	Cyclic voltammetry	Cervical specimen	HPV16	13.4 pM
Ref[2]	Gold electrode	Differential pulse voltammetry (reduction of MB)	Extracted DNA from cervical swabs	HPV16	18.1 nM
Ref[3]	Carbon	Anthraquinone square wave voltammetry	Human cancer cell line (PCR amplified)	HPV16	4 nM
Ref[4]	Nanocomposite of reduced graphene oxide(rGO) and multiwalled carbon nanotubes (MWCNTs) + Au nanoparticles	Differential pulse voltammetry	Extracted and PCR amplified DNA from cervix	HPV18	0.05 fM
IMEAC	Graphene oxide functionalized with cssDNA	Differential pulse voltammetry	Plasma	HPV16	0.48 µM

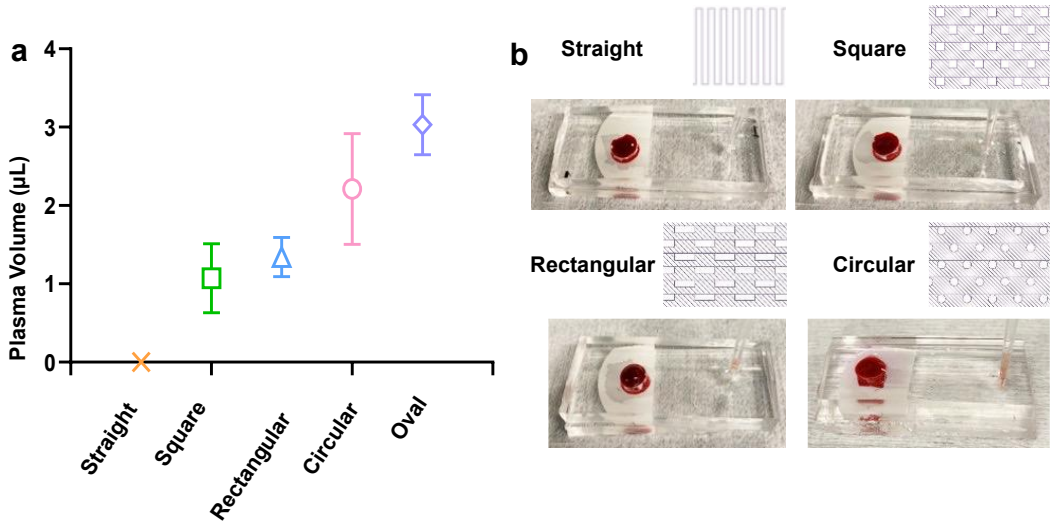
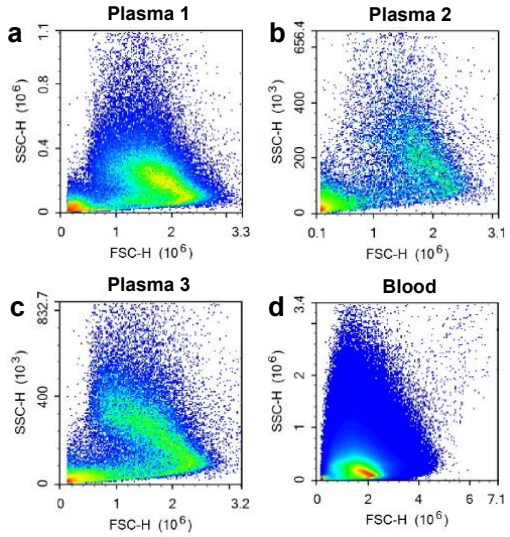


Fig. S1. Optimizing the shape of structures incorporated inside the micropump design based on the collected plasma volume.



Flow cytometry data for purity calculations

Sample	No of Total Cell	Filtered Cell	Purity
Plasma 1	80546400	5271960000	98.4952
Plasma 2	21234400	5331272000	99.6033
Plasma 3	46886400	5305620000	99.124
Blood	5352506400		

Fig. S2. Flow cytometry measurement for calculating the purity of plasma collected from the PPS device.

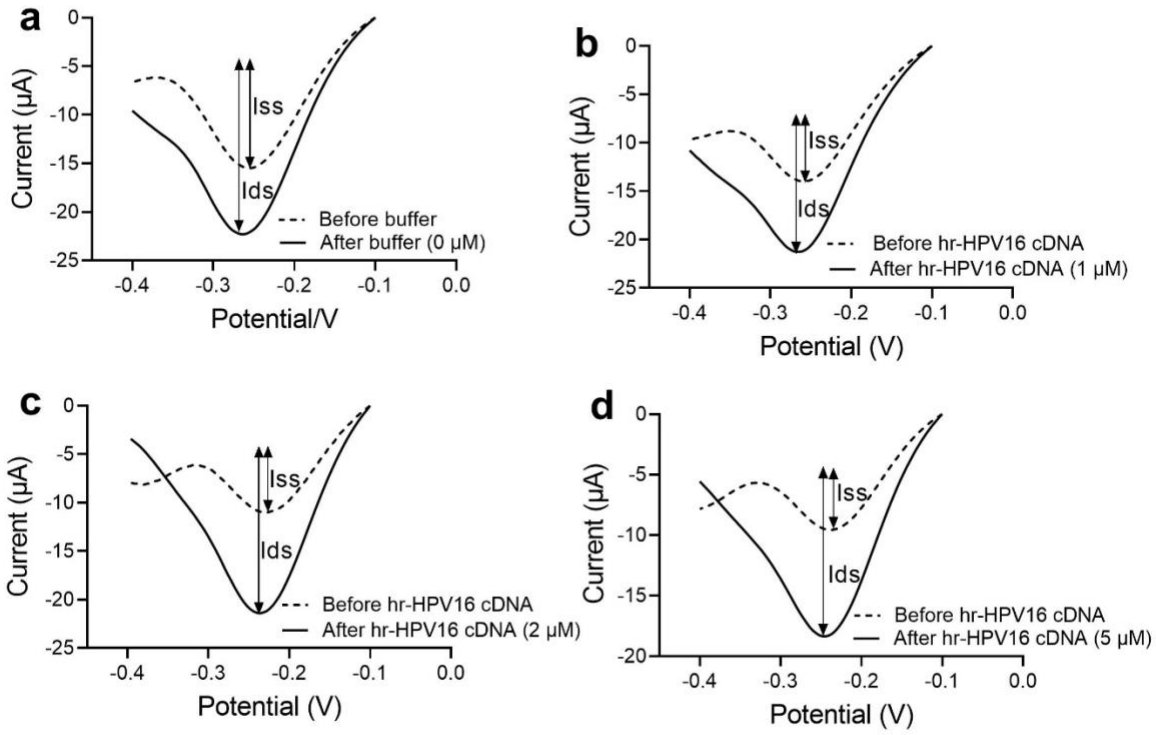


Fig. S3. The DPV scans before and after incubating GO-SPCE sensors with 0 μM **(a),** 1 μM **(b),** 2 μM **(c**), and 5 μM **(d)** of hr-HPV16 cDNA.

References

1. Avelino, K. Y. P. S., Oliveira, L. S., Lucena-Silva, N., Andrade, C. A. S. & Oliveira, M. D. L. Flexible sensor based on conducting polymer and gold nanoparticles for electrochemical screening of HPV families in cervical specimens. *Talanta* **226**, (2021).
2. Campos-Ferreira, D. S. *et al.* Electrochemical DNA biosensor for human papillomavirus 16 detection in real samples. *Anal. Chim. Acta* **804**, 258–263 (2013).
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4. Mahmoodi, P. *et al.* Early-stage cervical cancer diagnosis based on an ultra-sensitive electrochemical DNA nanobiosensor for HPV-18 detection in real samples. *J. Nanobiotechnology* **18**, 1–12 (2020).