Highly sensitive solid-state nanopore aptasensor based on target-induced strand displacement for okadaic acid detection from shellfish samples

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Table S1: aptamer and cDNA sequences used in this work

Name	Sequence 5’ to 3’	modification
Aptamer OA6T2	CCACCAACGAGA**GTCAGAAAACC**ATGGTGGG	5’ Biotin-TEG
Comp 1 (A_{20})	AAAAAAAAAAAAAAAAAAAAGGTTTTCTGAC	-
Comp 2 (A_{20})	AAAAAAAAAAAAAAAAAAAAGGTTTTCTGA	-
Comp 3 (A_{20})	AAAAAAAAAAAAAAAAAAAAGGTTTTCTG	-
Comp 4 (A_{20})	AAAAAAAAAAAAAAAAAAAAGGTTTTCT	-
Comp 5 (A_{20})	AAAAAAAAAAAAAAAAAAAAGGTTTTC	-
Comp 5	GGTTTTC	
Comp 5 (A_{10})	AAAAAAAAAAGGTTTTC	
Comp 5 (A_{15})	AAAAAAAAAAAAAAAGGTTTTC	
Comp 5 (A_{25})	AAAAAAAAAAAAAAAAAAAAAAAAAGGTTTTC	
Comp 5 (A_{30})	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAGGTTTTC	

Effect of the PEG-4000 treatment

The displacement assay was examined in relation to the utilisation of 0.5 mL centrifuge tubes for all experimental procedures. According to a study conducted by W. Shan et al., it has been observed that the lipophilicity of polyether substances present in centrifuge tubes increases the adsorption of Okadaic acid molecules onto the walls of the tubes[1]. In order to evaluate this hypothesis, we conducted the displacement assay reaction utilising a concentration of 1 µg/mL of OA molecules. The reaction was carried out in two separate tubes, with one tube being rinsed with deionized (DI) water and the other tube being rinsed with a 1% PEG-4000 solution. Figure S1 provides additional evidence supporting the findings reported by Shan et al. Specifically, the application of PEG-4000 treatment effectively decreased the adsorption of OA molecules onto the tube's surface. Consequently, this treatment led to an increase in the frequencies of the signals observed.

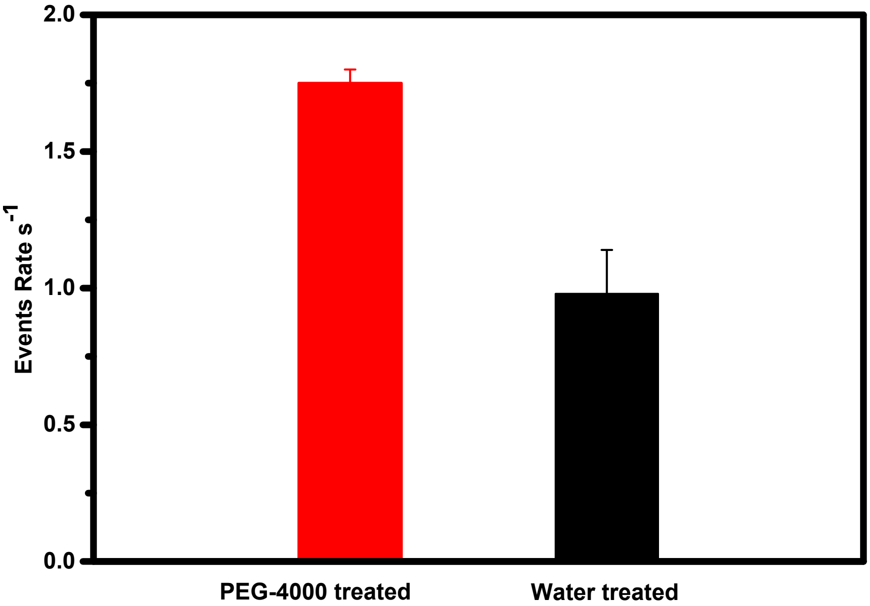

Figure S1. Effect of the PEG-4000 and water treatment of the centrifuge tubes on the nanopore's signals frequency.

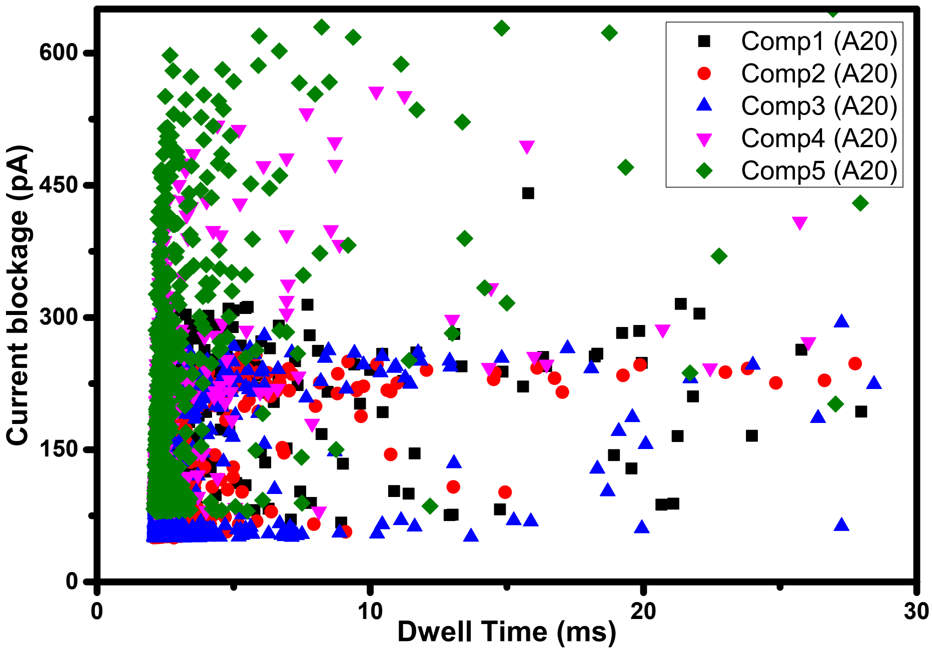

Figure 2. Scatter plot of the translocation of the different cDNA: comp 1(A_{20}), comp 2(A_{20}), comp 3(A_{20}), comp 4(A_{20}), and comp 5(A_{20})

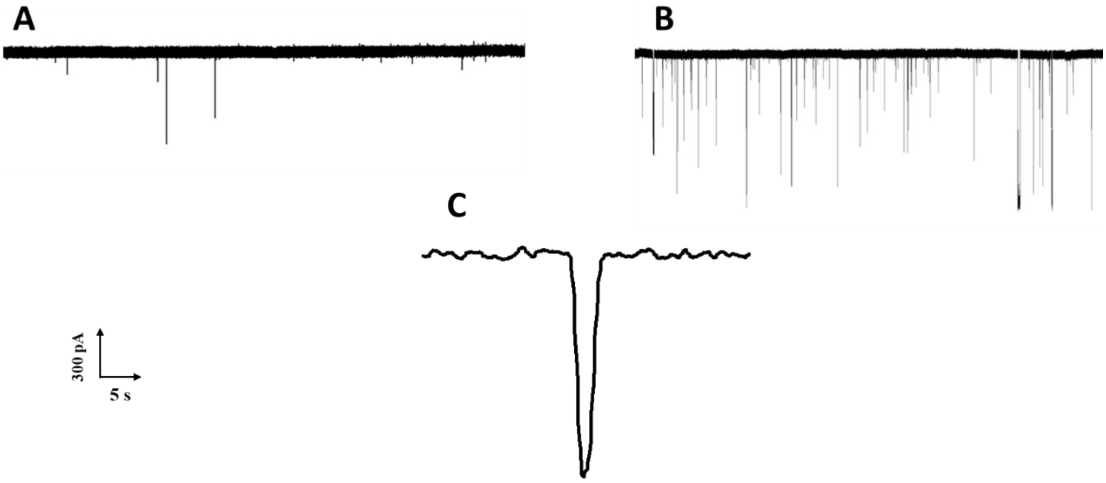

Figure S3. Current traces of the translocation of A) the control solution, B) cDNA Comp 5 (A20)-containing solution. C) The signal shape of the cDNA Comp 5 (A_{20})

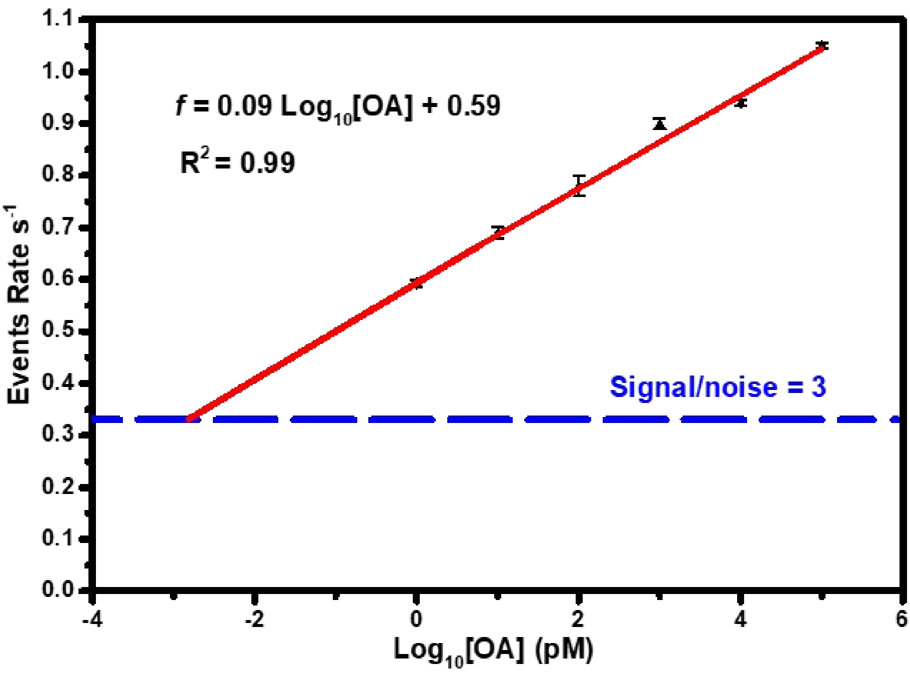

Figure S4. The calibration curve of our nanopore-based aptasensor. The blue dash line represents 3 times the noise level from the background signal

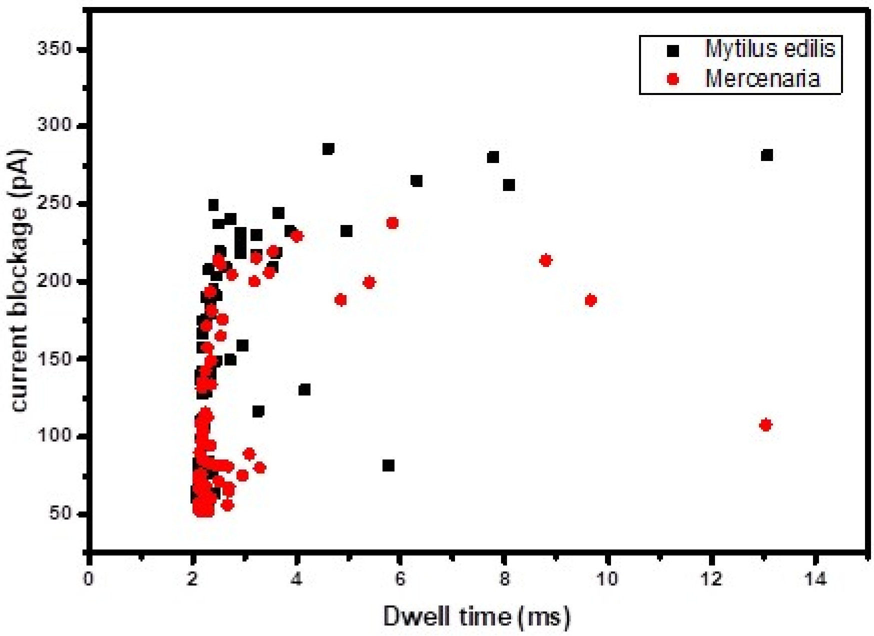

Figure S5: Scatter plot of the translocation signals of the two real sample extracts.

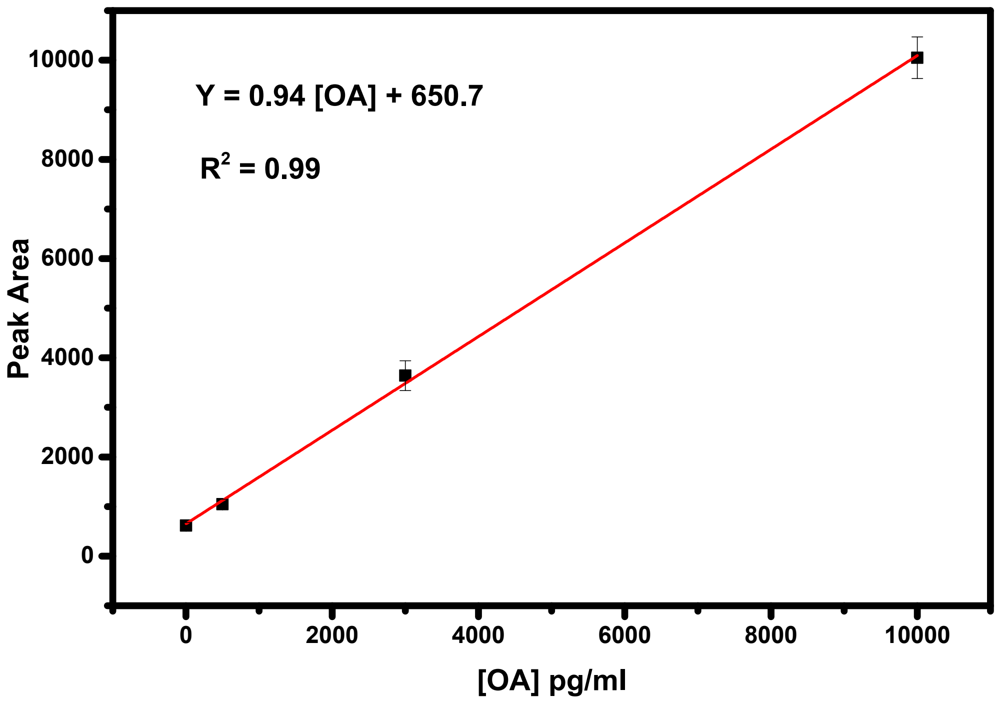

Figure S6. Calibration curve of the LC-MS/MS detection of OA molecules

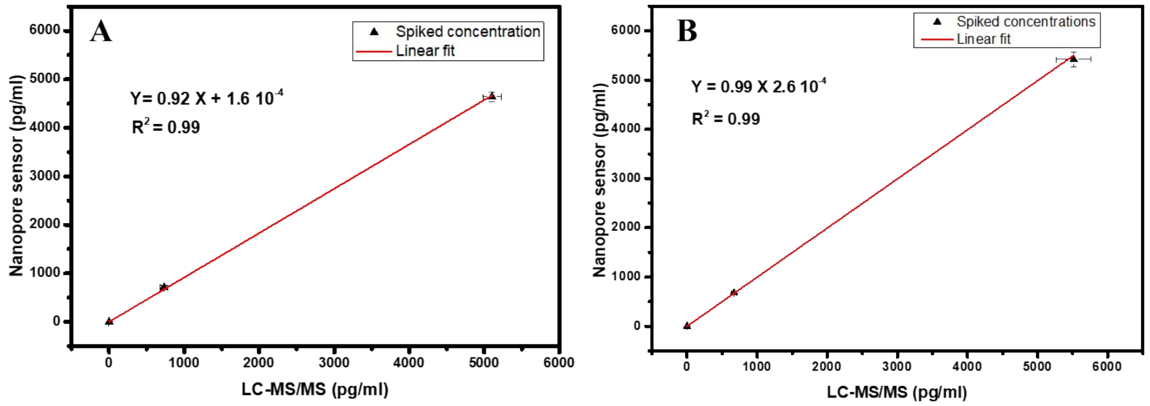

Figure S6. Relationship between the nanopore sensor and LC-MS/MS for OA detection spiked in shellfish extracts A) Mytilus edilis. B) Mercenaria. Error bars were calculated from three replicate measurements.

Reference:

1 W. Shan, J. Sun, R. Liu, W. Xu and B. Shao, *Sensors Actuators B Chem.*, 2022, **352**, 131035.