

Single-molecule discrimination of different types of glycosaminoglycans by nanopore sensing

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Glycosaminoglycans (GAGs) are polysaccharides, which play critical roles in various physiological and pathological processes. The characterization of GAGs remains challenging due to a lack of tools to probe their highly diverse, heterogeneous and complex structures [1]. Nanopore technology has emerged as a powerful single-molecule approach with extensive applications in personalized medicine and disease research [2]. Here, we developed nanopore technique for discrimination of several types of GAGs. By investigated a range of different electrolytes, our results showed that different types of GAGs can be clearly identified. A deep learning model was developed to automatically classify different GAGs with a high accuracy, which is confirmed by different mixture samples. These results provide a valuable step towards analysis and sequencing of long GAGs with nanopores.

[1] Perez, S. *et al.* Glycosaminoglycans: What Remains To Be Deciphered? *JACS Au* **3**, 628–656 (2023).

[2] Cao, C. *et al.* Deep Learning-Assisted Single-Molecule Detection of Protein Post-translational Modifications with a Biological Nanopore. *ACS Nano*, **18**, 2, 1504–1515. (2024)