Protein discrimination using aptamer-functionalized nanopores

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Abstract

Protein detection and identification at the single-molecule level is a major challenge in many biotechnological fields. Solid-state nanopores have raised attention as label-free biosensors with high sensitivity. Here, we use solid-state nanopore sensing to discriminate two closely related proteins, α- and ɣ-thrombin. We show that aptamer functionalization improves protein discrimination thanks to a significant difference in the relative current blockade amplitude. To enhance discrimination, we post-processed the signals using machine learning and training algorithms and we were able to reach an accuracy of 98.8 % of the signals generated by γ-thrombin and α-thrombin respectively.