

Abstract Sheet

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Abstract 【English】

We developed a novel artificial intelligent nanopore platform capable of effectively detecting different families of human viruses. Using machine learning algorithm, the nanopores are adequately trained with the cultured specimen of four types of human coronaviruses, namely, HCoV-229E, SARS-CoV, MERS-CoV, and SARS-CoV-2. The artificial intelligence has revealed a superior accuracy, specificity and sensitivity. The study also shows that the nanopore platform does not require the extraction of RNA from the virus as compared to the conventional RT-PCR virus detection methods. The duration to detect the virus is also proven to be much less as compared to the conventional methods. The conducted research is one of the pioneering work in the effective detection of the novel coronavirus. It demonstrates the artificial intelligence assisted learning of nanopore platform that results in improved accuracy and versatility while detecting different pathogens.

Abstract 【日本語】

ナノポアとAIが融合したAIナノポアは、ナノポアを流れるイオン電流変化を機械学習することで、1個のウイルスを検出・識別する。AIナノポアは、HCoV-229E、SARS-CoV、MERS-CoV、およびSARS-CoV-2を、1つのイオン電流—時間波形で、67%の精度で識別できた。また、インフルエンザウイルスAとSARS-CoVは、90%の精度で識別された。新型コロナウイルスのPCR陽性・陰性の唾液検体のイオン電流—時間波形を機械学習させ、検査した結果、5分間の計測時間で、感度90%、特異度96%であった。AIナノポアを用いる新型コロナウイルス検査法は、他のウイルスや細菌の検査法に応用できる。