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BIOSENSORS FOR PANDEMICS

# Electrochemical detection of multiple RNA targets using MXene/duplex-specific nuclease: A path towards simultaneous detection of SARS-CoV-2 and H1N1 influenza virus

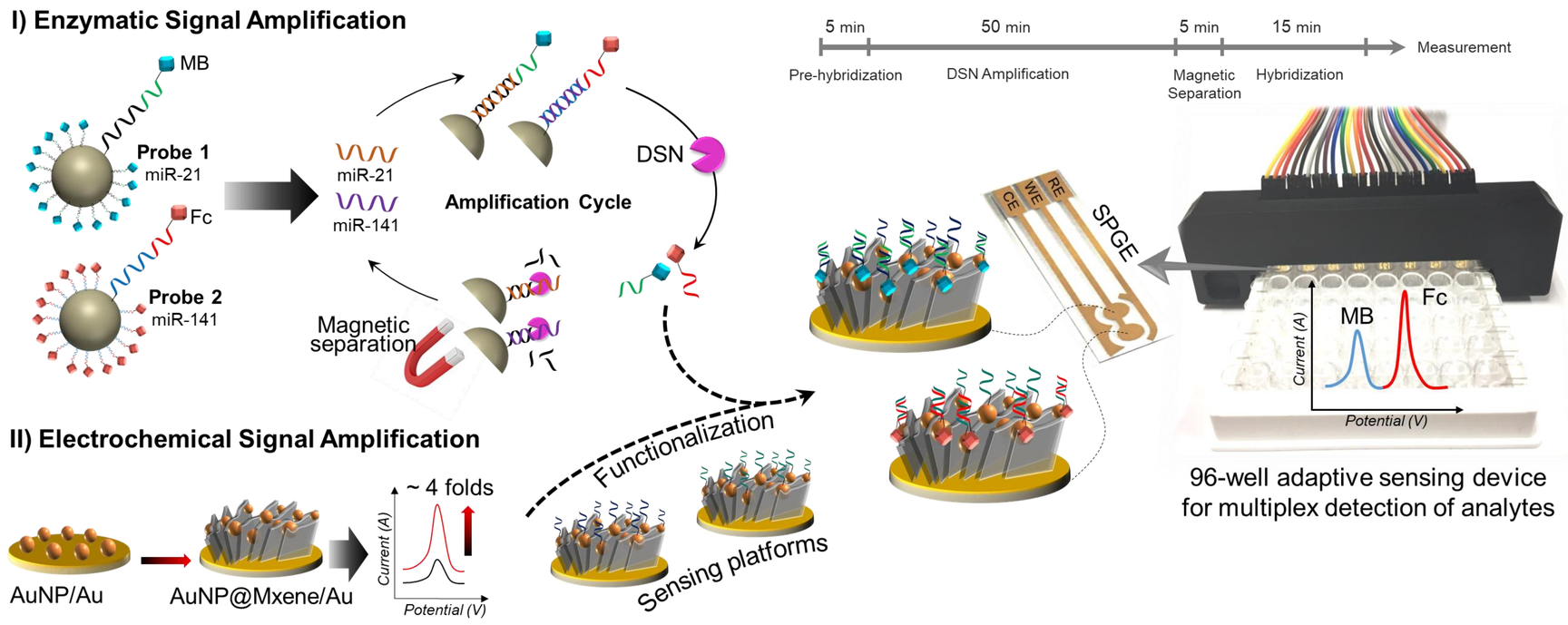
Mohsen Mohammadniaei[a], Aneesh Koyappayil[b], Junhong Min[b], Min-Ho Lee[b] and Yi Sun[a]

[a] Department of Health Technology, Technical University of Denmark, Kongens Lyngby, DK, 2800, Denmark.
[b] School of Integrative Engineering, Chung-Ang University, Heukseok-dong, Dongjak-gu, Seoul, 06910, Korea.

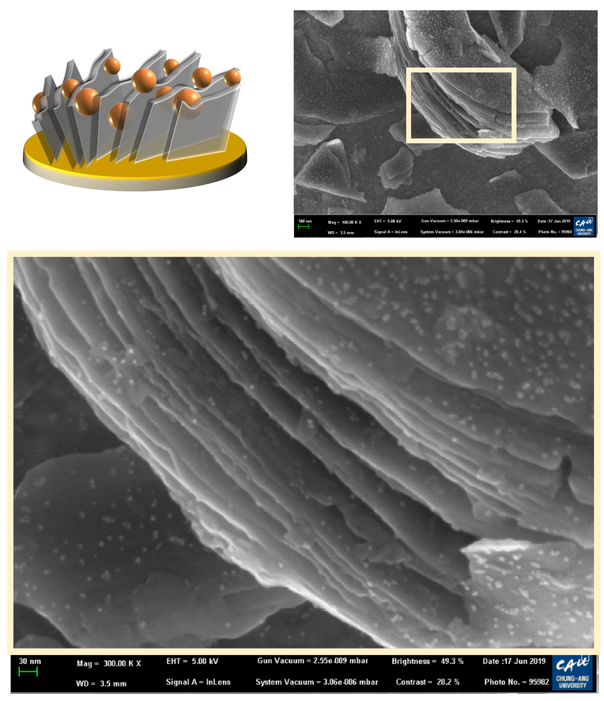
## Introduction

Rapid and sensitive detection of SARS-CoV-2 in an affordable fashion is vital for the early diagnostics of the COVID-19. Moreover, with the inevitable emergence of the upcoming seasonal influenza (flu), it is highly important to develop a biosensor capable of differentiating influenza virus from SARS-CoV-2 in order for the healthcare professionals to prescribe the most appropriate medications.

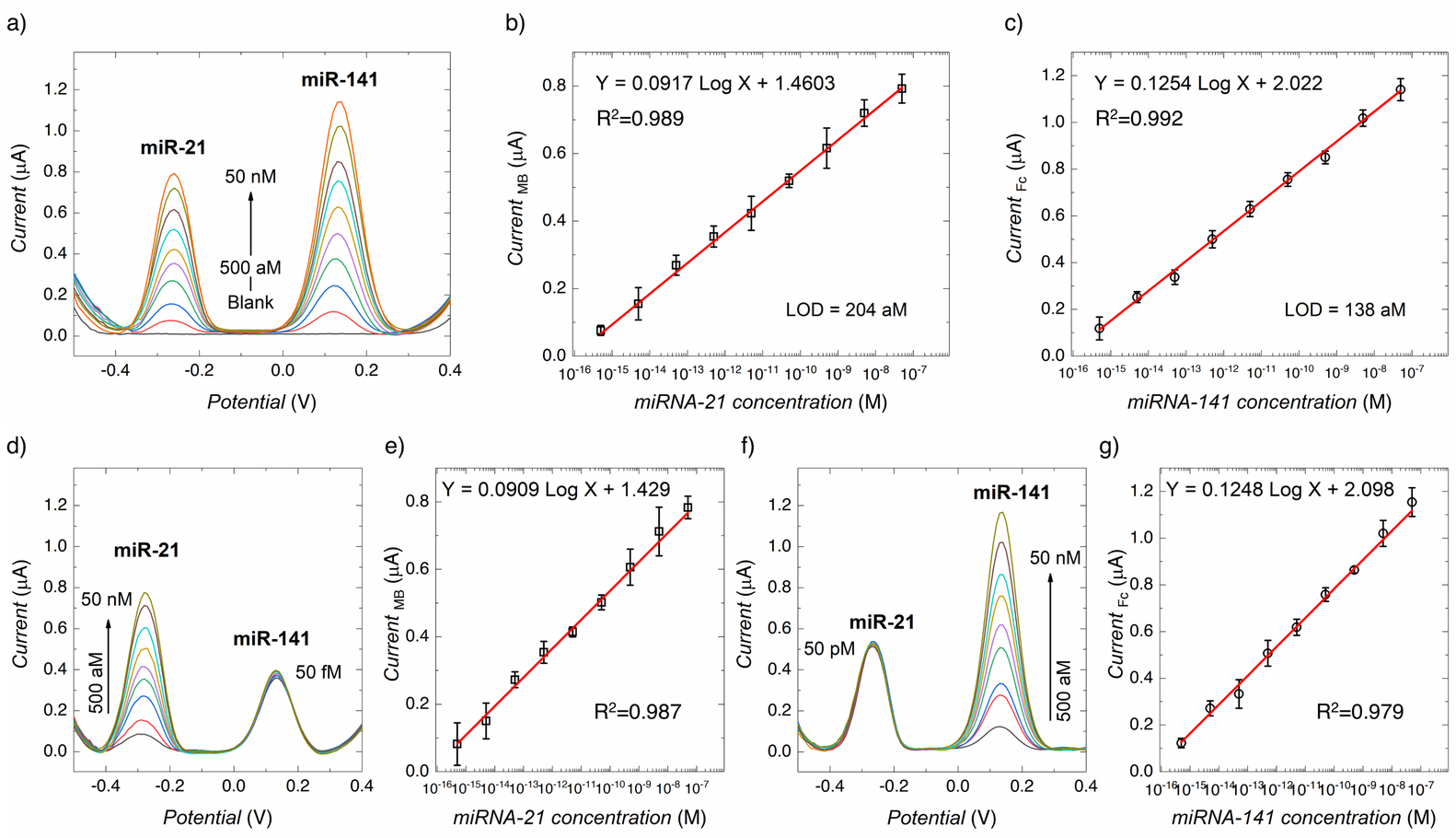
## Concurrent detection of multiple RNAs



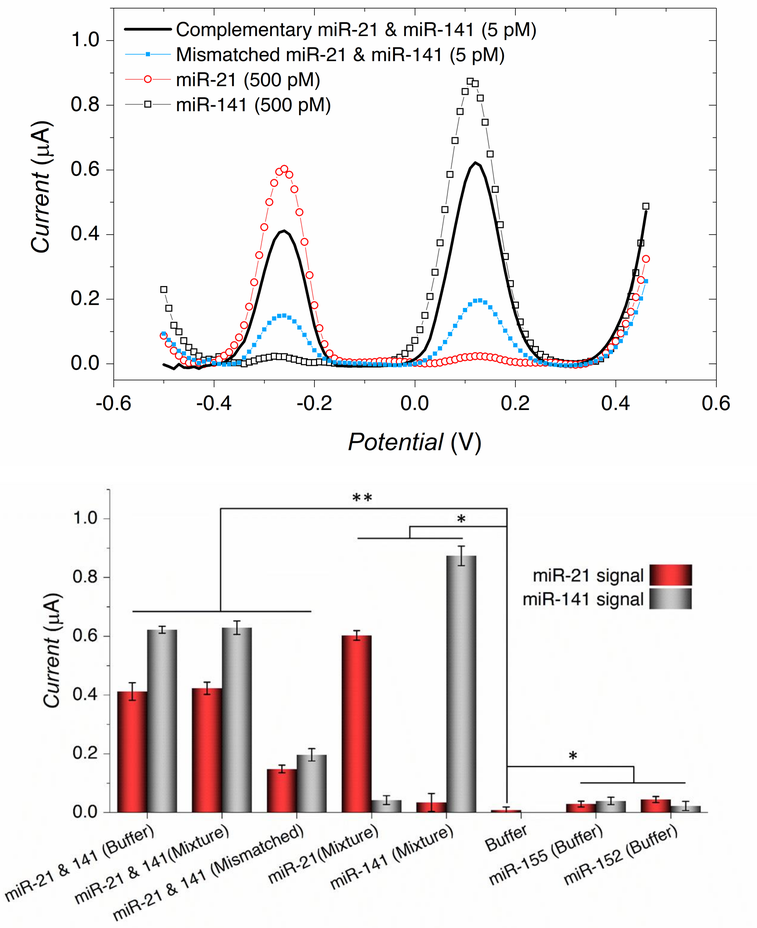

## SEM image of AuNP@MXene/Au




## Sensor performance




## Selectivity and specificity analysis




## Conclusion

- A novel synergetic signal amplification system is reported for multiple, rapid and attomolar quantification of microRNAs.
- MXene-$Ti_3C_2T_x$ is synthesized and modified with 5 nm gold nanoparticles (AuNPs) as the electrochemical signal booster by almost 4 times of magnitude.
- DSN-based amplification system enhanced the sensitivity and provided single-mutation recognition ability.
- The biosensor could detect both target RNAs in 80 min with the detection limits of 204 aM and 138 aM and a wide linear range from 500 aM to 50 nM demonstrating promising features for the fabrication of practical devices

## Main challenge

- How to adapt the proposed biosensor for detection of long RNA genomes of SARS-CoV-2 and h1N1?
- We are currently working on the matter and appreciate any practical comment.

## CONTACT PERSON

**Mohsen Mohammadniaei**
Postdoc fellow
DTU Health Tech.
mohmo@dtu.dk

## REFERENCES

- Khurshid, Z. Asiri, Wadaani, H, Int. J. Environ. Res. Public Health, 17, (2020) 2225.
- Yang T, Wang YC, Shen CF, Cheng CM., Diagnostics, 10 (2020) 165.
- Mohammadniaei M, Sun Y, Min J, Lee M, Biosens. Bioelectron., 159 (2020) 112208.

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