Improving the sensor performance for SARS-CoV-2

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Abstract (Arial 11)

The coronavirus disease 2019 (COVID-19) has now penetrated every populated patch of the globe and sows destruction in our daily life. Reliable and sensitive virus sensing systems are therefore of vital importance for timely infection detection and transmission prevention. We have developed a dual-functional plasmonic photothermal biosensor for detection of SARS-CoV-2 [1], which was validated by testing clinical COVID-19 patient samples, and indicated its potential applications in fast clinical infection screening and real-time environmental monitoring. We developed a simple framework to integrate the *a priori* dose-response relation for SARS-CoV based on mice experiments, the recent data on infection risk from a meta-analysis and the respiratory virus shedding in exhaled breath, to shed light on the dose-response relation for human [2]. The aerosol transmission infection risk was evaluated based on the dose-response model for both typical indoor environment [2] and a Chinese seafood market [3].

REFERENCES

[1] Qiu, G., Gai, Z., Tao, Y., Schmitt, J., Kullak-Ublick, G.A., Wang, J. (2020) Dual-Functional Plasmonic Photothermal Biosensors for Highly Accurate Severe Acute Respiratory Syndrome Coronavirus 2 Detection, *ACS Nano*, https://dx.doi.org/10.1021/acsnano.0c02439

[2] Zhang, X. and Wang, J. (2020) Dose-response Relation Deduced for Coronaviruses from COVID-19, SARS and MERS Meta-analysis Results and its Application for Infection Risk Assessment of Aerosol Transmission, *Clinical Infectious Diseases*, https://doi.org/10.1093/cid/ciaa1675 .

[3] Zhang, X.; Ji, Z.; Yue, Y.; Liu, H.; Wang, J. (2020) Infection risk assessment of COVID-19 through aerosol transmission: a case study of South China Seafood Market, *Environmental Science and Technology*, https://dx.doi.org/10.1021/acs.est.0c02895 .

FIGURES

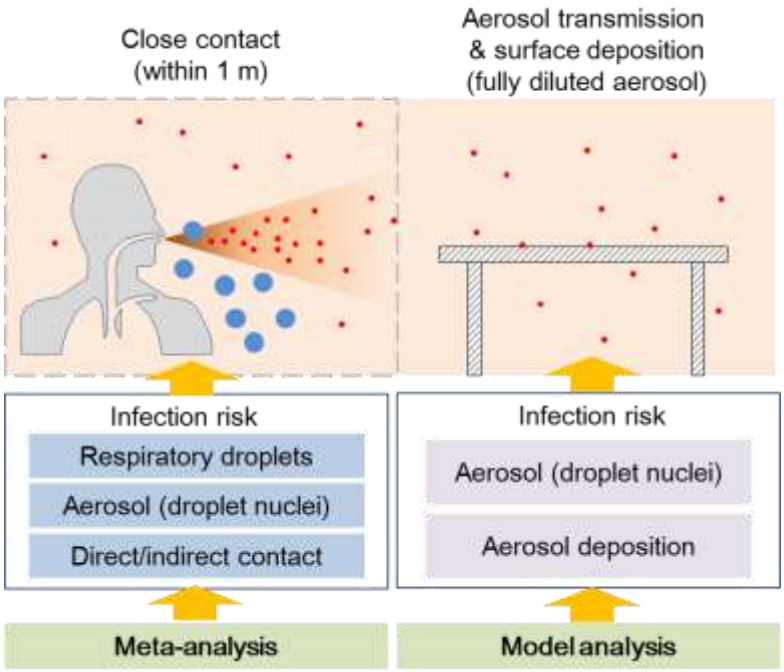

Figure 1: Schematic graph for the comparison between the infection risk of close contact and aerosol transmission & surface contamination induced by aerosol deposition.