BRIC

인쇄 닫기

강태준(Taejoon Kang)
한국생명공학연구원

Biosens. Bioelectron., Available online 20 January 2022, Volume 202, 114008 |
https://doi.org/10.1016/j.bios.2022.114008

Surface-enhanced Raman scattering-based immunoassay for severe acute respiratory syndrome coronavirus 2

Authors and Affiliations

Hyunjung Cha[a], Hyeran Kim[a], Younju Joung[b], Hyunju Kang[a], Jeong Moon[a,c], Hyowon Jang[a], Sohyun Park[b], Hyung-Jun Kwon[d], In-Chul Lee[d], Sunjoo Kim[e], Dongeun Yong[f], Sun-Woo Yoon[a], Sung-Gyu Park[g], Kyeonghye Guk[a], Eun-Kyung Lim[a,h], Hyun Gyu Park[c], Jaebum Choo[b,*], Juyeon Jung[a,*], Taejoon Kang[a,*]

[a]Bionanotechnology Research Center, Korea Research Institute of Bioscience and Biotechnology (KRIBB), Daejeon, 34141, Republic of Korea

[b]Department of Chemistry, Chung-Ang University, Seoul, 06974, Republic of Korea

[c]Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, 34141, Republic of Korea

[d]Functional Biomaterial Research Center, Korea Research Institute of Bioscience and Biotechnology (KRIBB), Jeongeup, 56212, Republic of Korea

[e]Department of Laboratory Medicine, Gyeongsang National University College of Medicine, Jinju, 52828, Republic of Korea

[f]Department of Laboratory Medicine and Research Institute of Bacterial Resistance, Yonsei University College of Medicine, Seoul, 03722, Republic of Korea

[g]Nano-Bio Convergence Department, Korea Institute of Materials Science (KIMS), Changwon, 51508, Republic of Korea

[h]Department of Nanobiotechnology, KRIBB School of Biotechnology, University of Science and Technology (UST), Daejeon, 34113, Republic of Korea

[*]Corresponding author.

Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has affected humans worldwide for over a year now. Although various tests have been developed for the detection of SARS-CoV-2, advanced sensing methods are required for the diagnosis, screening, and surveillance of coronavirus disease 2019 (COVID-19). Here, we report a surface-enhanced Raman scattering (SERS)-based immunoassay involving an antibody pair, SERS-active hollow Au nanoparticles (NPs), and magnetic beads for the detection of SARS-CoV-2. The selected antibody pair against the SARS-CoV-2 antigen, along with the magnetic beads, facilitates the accurate direct detection of the virus. The hollow Au NPs exhibit strong, reproducible SERS signals, allowing sensitive quantitative detection of SARS-CoV-2. This assay had detection limits of 2.56 fg/mL for the SARS-CoV-2 antigen and 3.4 plaque-forming units/mL for the SARS-CoV-2 lysates. Furthermore, it facilitated the identification of SARS-CoV-2 in human nasopharyngeal aspirates and diagnosis of COVID-19 within 30 min using a portable Raman device. Thus, this assay can be potentially used for the diagnosis and prevention of COVID-19.

Keywords : Antibody, Coronavirus disease 2019, Immunoassay, Nanoparticle, Surface-enhanced Raman scattering, Severe acute respiratory syndrome coronavirus 2

논문정보

- 형식: Research article
- 게재일: 2022년 01월 (BRIC 등록일 2022.02.02)
- 연구진: 국내연구진
- 분야: Nanobio