Proceedings of the 4th International Conference on Theoretical and Applied Nanoscience and Nanotechnology (TANN'20)
~~Niagara Falls, Canada~~ Virtual Conference – November, 2020
Paper No. 137
DOI: 10.11159/tann20.137

Gold Nanoparticle-Coated Microspheres for Enhancing Immunosensor Detection of Hepatitis B Virus Surface Antibody

Pitirat Pholpabu[1,*], Rungtiva P. Poo-arporn[1], Dujduan Waraho-Zhmayev[1], Boonnisa Watcharapathorn[2], Chanikan Thongdaeng[2], Paisit Luesiripanich[2], Thonthun Tueanwiradet[2], Jadsadakorn Juntratip[2]
[1] Biological Engineering Program, Faculty of Engineering King Mongkut's University of Technology Thonburi
Bangkok, Thailand
pitirat.pho@mail.kmutt.ac.th
[2] Darunsikkhalai Science School
King Mongkut's University of Technology Thonburi
Bangkok, Thailand

Abstract **-** Gold nanoparticle-coated calcium carbonate microspheres (NPCM) were fabricated and utilized to create a paper-based lateral flow immunosensor with an enhanced limit of detection of hepatitis B virus surface antibody. Spherical calcium carbonate microspheres in a form of vaterite crystal were successfully synthesized and coated with gold nanoparticles to serve as a signaling material, as opposed to typical free gold nanoparticles (AuNP). The size of calcium carbonate microspheres was controlled by an addition of ethylene glycol and dropwise precipitation to facilitate a flow of NPCM through a nitrocellulose membrane. The results demonstrate that the colorimetric signal of HBsAb detection was enhanced by NPCM, resulting in the lower limit of detection from 100 ng/mL, when using AuNP, to as low as 20 ng/mL. Determination of positive/negative result was in only 20 min. Gold nanoparticle-coated microsphere-based immunosensor should be, consequently, considered as an efficient signaling material for designing a paper-based lateral flow immunosensor for a detection of biomolecules.

Keywords**:** test strip, gold nanoparticle, calcium carbonate microsphere, lateral flow, immunosensor