

# Portable Paper-Based Immunoassay Combined with Smartphone Application for Colorimetric and Quantitative Detection of Dengue NS1 Antigen

Muhammad Hatta Prabowo<sup>1,2</sup>, Thanit Chalermwatanachai<sup>3</sup>, Werasak Surareungchai<sup>2</sup>, Patsamon Rijiravanich<sup>4,5</sup>

<sup>1</sup>Department of Pharmacy, Faculty of Mathematics and Natural Sciences, Universitas Islam Indonesia <sup>2</sup>School of Bioresources and Technology, King Mongkut's University of Technology Thonburi <sup>3</sup>Department of Otolaryngology, Phramongkutklao Hospital and College of Medicine <sup>4</sup>Sensor Technology Laboratory, Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi <sup>5</sup>Biosciences and Systems Biology Research Team, National Center for Genetic Engineering and Biotechnology, National Sciences and Technology Development Agency at King Mongkut's University of Technology Thonburi

## Corresponding Author

Patsamon Rijiravanich  
patsamon.rij@biotec.or.th

## Citation

Prabowo, M.H., Chalermwatanachai, T., Surareungchai, W., Rijiravanich, P. Portable Paper-Based Immunoassay Combined with Smartphone Application for Colorimetric and Quantitative Detection of Dengue NS1 Antigen. *J. Vis. Exp.* (2023), e66130, doi:10.3791/66130 (2024).

## Date Published

January 26, 2024

## DOI

10.3791/66130

## URL

jove.com/video/66130

## Materials

Name	Company	Catalog Number	Comments
<b>Materials</b>			
0.1 M phosphate-buffered saline (PBS, pH 7.2)			
BBS containing 0.1% Tween 20, 10% sucrose, and 1% casein			the conjugate area treatment and blocking buffer
Borate buffered saline (BBS) (25 mM sodium borate and 150 mM sodium chloride at pH 8.2) supplemented with 1% BSA			the washing buffer during the conjugation process AuNPs with the antibody
Boric acid	Merck	10043-35-3	
Bovine serum albumin fraction V (BSA)	PAA Lab GmbH (Germany)	K41-001	
Casein	Merck	9005-46-3	
Chromatography paper Grade 2	GE Healthcare	3002-911	
Clear laminate film	3M (Stationery shops)		
Disodium hydrogen phosphate	Merck	7558-79-4	
Double tape side	Stationery shops		
Goat anti-mouse IgG antibody	MyBiosource (USA)	MBS435013	
Gold nanoparticles (40 nm)	Serve Science Co., Ltd. (Thailand)		
Human IgG polyclonal antibody	Merck	AG711-M	
Mouse dengue NS1 monoclonal antibody	MyBiosource (USA)	MBS834415	
Mouse dengue NS1 monoclonal antibody	MyBiosource (USA)	MBS834236	
NS1 serotype 2 antigens	MyBiosource (USA)	MBS 568697	

PBS 1X containing 0.1% Tween 20 was used as t			elution buffer
Plastic backing card 10x30 cm	Pacific Biotech Co., Ltd. (Thailand)		
Poly-L-lysine (PLL)	Sigma Aldrich	P4832	
Potassium Chloride	Merck	104936	
Potassium monophosphate	Merck	104877	
Sodium Chloride	Merck	7647-14-5	
Sodium tetraborate	Sigma Aldrich	1303-96-4	
Sucrose	Merck	57-50-1	
Tween 20	Sigma Aldrich	9005-64-5	
<b>Instruments</b>			
Cytation™ 5 multimode reader	BioTek		
Mobile phones	Huawei Y7, iPhone 11, Samsung a20		
Photo scanner	Epson Perfection V30		
Oven	Memmert		
Wax printer	Xerox ColorQube 8880-PS		
<b>Software</b>			
Could AutoML Vision Object Detection documentation	Google Cloud		
ImageJ	National Institute of Health, Bethesda, MD, USA		
Inkscape 0.91 Software			