

Supplementary Information

Highly sensitive colorimetric detection of allergies based on an immunoassay using peroxidase- mimicking nanozymes

Seongyeon Cho,^{a#} Sang Min Lee,^{b#} Ho Yun Shin,^a Min Su Kim,^c Yiel Hea Seo,^d Yong Kyun Cho,^e Jinwoo Lee,^c Sang Pyo Lee^{*b} and Moon Il Kim^{*a}

a. Department of BioNano Technology, Gachon University, 1342 Seongnamdae-ro, Sujeong-gu, Seongnam, Gyeonggi 13120, Republic of Korea.

b. Division of Pulmonology and Allergy, Department of Internal Medicine, Gachon University Gil Medical Center, Incheon, 21565, Republic of Korea.

c. Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), Pohang, Gyeongbuk 37673, Republic of Korea

d. Department of Laboratory Medicine, Gachon University Gil Medical Center, Incheon 21936, Republic of Korea

e. Division of Infection, Department of Internal Medicine, Gachon University Gil Medical Center, Incheon 21936, Republic of Korea

#. These authors contributed equally to this work.

*To whom correspondence should be addressed. Tel.: +82-31-750-8563; Fax: +82-31-750-4748. E-mail: moonil@gachon.ac.kr (M. I. Kim); allergy21@hotmail.com (S. P. Lee)

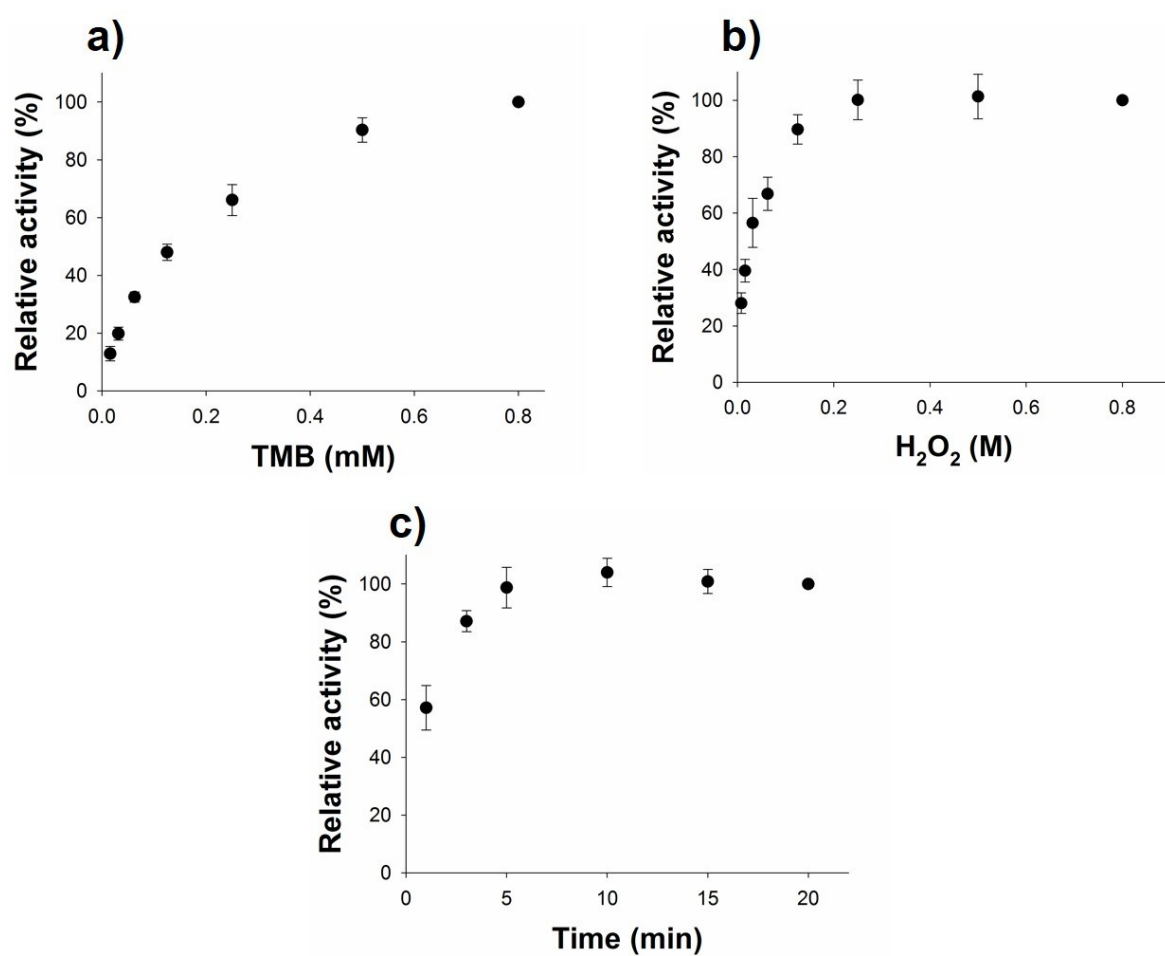


Figure S1. Effects of the concentrations of a) TMB, b) H₂O₂, and reaction time on the catalytic activity of H-Pt NPs for TMB oxidation. The error bars represent the standard deviation derived from three independent measurements.

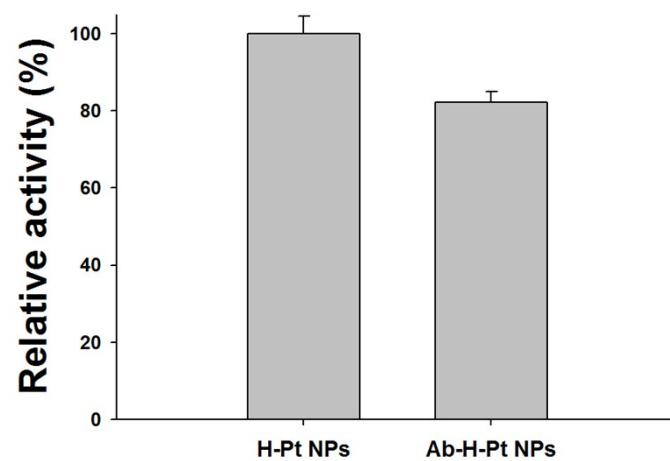


Figure S2. Comparison of the initial activities between H-Pt NPs and H-Pt NPs conjugated with anti-IgE (Ab-H-Pt NPs).

Table S1. Comparison of the linear range and detection limit of the various IgE detection systems with the present H-Pt NP-based immunoassay.

Target	Detection methods	Linear range (kU/L)	Detection limit (kU/L)	Ref.
Total IgE	Fluorescence (ImmunoCAP assay)	2 - 5000	NR ^[a]	1
	Fluorescence (quantum dot-based immunochromatographic assay)	5 - 1000	NR	2
	Colorimetry (HRP-based immunoassay)	50 - 1000	3	3
	Colorimetry (H-Pt NP-based immunoassay)	0.4 - 1000	0.25	This study
Specific IgE	Fluorescence (ImmunoCAP assay)	0.35 - 100	NR	1
	Chemiluminescence (immunoassay using IMMULITE® 2000 system)	0.35 - 100	0.1	4
	Colorimetry (HRP-based immunoassay)	0.35 – 17.5	0.1	3
	Colorimetry (H-Pt NP-based Immunoassay)	0.35 - 17.5	0.17	This study

^[a] NR = Not reported.

References

- 1 *ImmunoCAP Product Catalog 2016*. Thermo Scientific. Phadia AB, Uppsala Sweden, 2016.
- 2 A. N. Berlina, N. A. Taranova, A. V. Zherdev, M. N. Sankov, I. V. Andreev, A. I. Martynov and B. B. Dzantiev, *Plos One*, 2013, **8**, e77485.
- 3 T. Ishizaka, *Ann Allergy*, 1982, **48**, 313-319.
- 4 T. M. Li, T. Chuang, S. Tse, D. Hovanec-Burns and A. S. El Shami, *Ann Clin. Lab Sci.*, 2004, **34**, 67-74.