Supporting Information

Toehold-Mediated Strand Displacement Coupled with Single Nanoparticle Dark-Field Microscopy Imaging for Ultrasensitive Biosensing

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Content

Table S1 DNA and RNA sequences in this work.

Name	Sequences（5’-3’）
Substrate strand (Sub)	TCAACATCAGTCTGATAAGCTATAGGGCCGTAAGTTAGTGAGATT TTTTTTTTT-NH_2
P1	TCTCACTAACTTACGG
P2	CCCTATAGCTTATCAGACT
Assist strand	TAACTTACGGCCCTATAGCTTATCAGACTTTTTTTTTTTTTTTT-Bio
miRNA-21 （Target）	UAGCUUAUCAGACUGAUGUUGA
Single base mismatched miRNA	UAGCUUAUCAGACUGAUGUAGA
Two bases mismatched miRNA	UAAGUUAUCAGACUGAUGUAGA
miRNA-144	UAACACUGUCUGGUAAAGAUGG
miRNA-122a	UGGAGUGUGACAAUGGUGUUUG
miRNA-32	UAUUGCACAUUACUAAGUUGCA

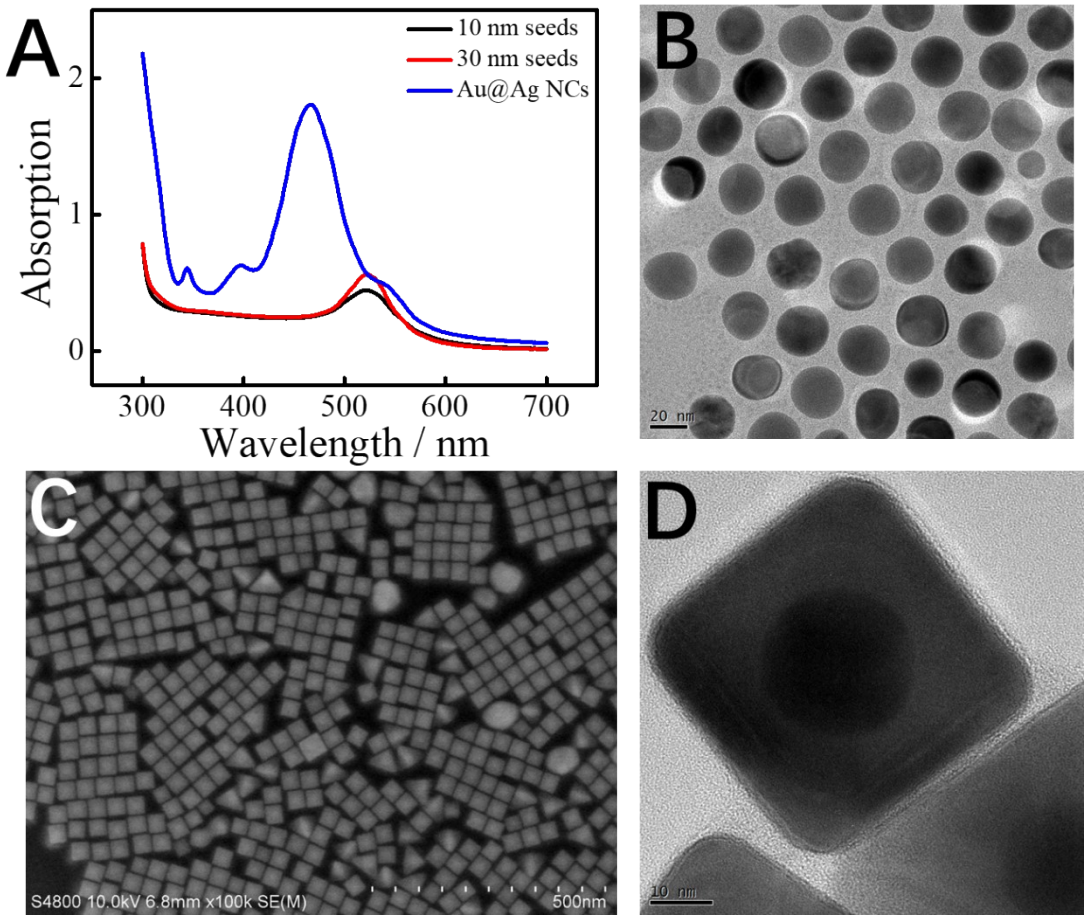

Figure S1 (A) The UV-Vis spectrum changes during the synthetic process. (B) TEM image of gold seeds before Au@AgNCs prepared. (C) Large scale of SEM image and (D) High resolution transmission electron microscopy image of as prepared Au@Ag NCs.

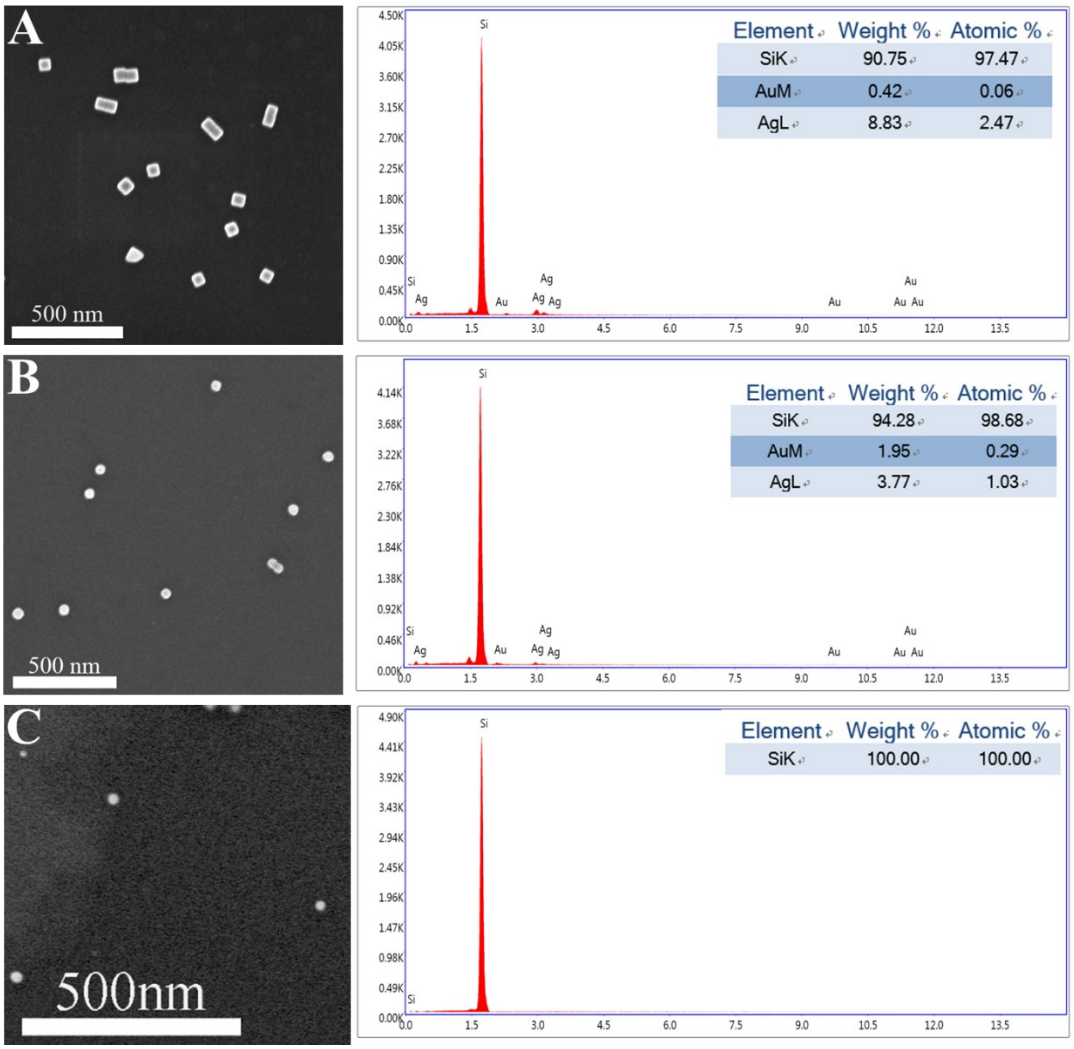

Figure S2 The SEM (left) and EDS (right) characterization of Au@AgNCs with reaction time at (A) 0 min, (B) 60 min, and (C) 120 min.

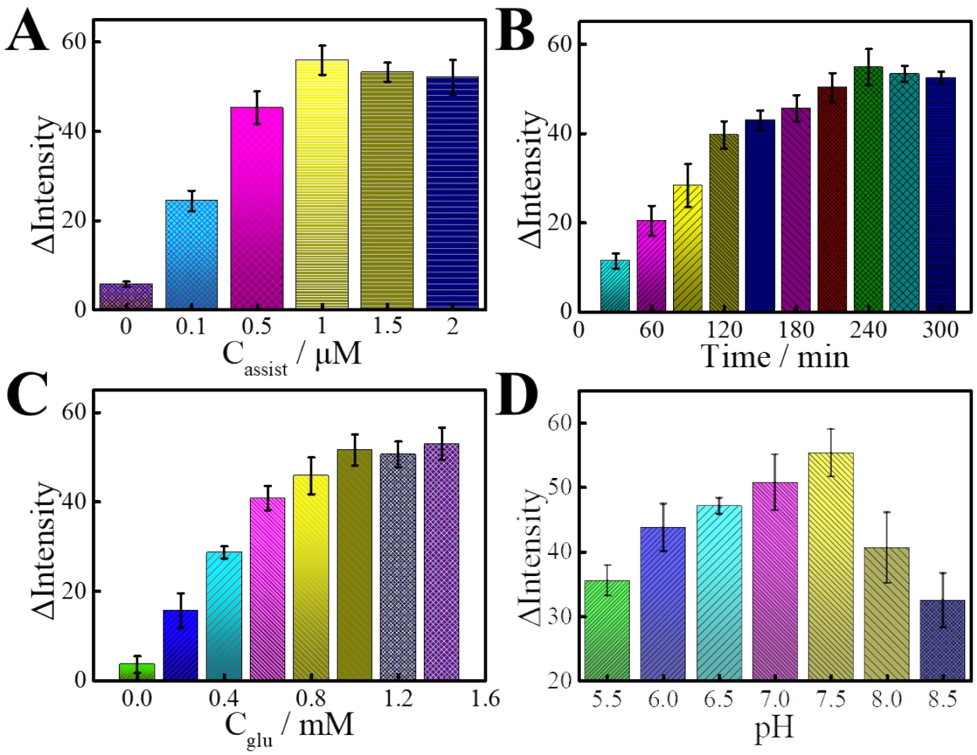

Figure S3 The effect of (A) assist concentration, (B) TSMD reaction time, (C) glucose concentration and (D) pH value of buffer solution on the Au@AgNCs scattering intensity changes, target concentration was 100 fM.

Table S2 The comparison of analytic performance of diverse methods for miRNA-21 detection.

Detection Method	Signal Amplification Strategy	Linear Range	Detection Limit (fM)	Ref.
Fluorescence	nuclease assisted target recycling	0.1~100 nM	100 fM	S1
Fluorescence	nuclease assisted target recycling	0.5 ~500 pM	0.4 pM	S2
Fluorescence	enzyme-free amplification	1.0 pM ~ 1.0 nM	1.0 pM	S3
Electrochemical	Hierarchical Flower-Like Gold Nanostructures	1.0 fM~100.0 pM	1.0 fM	S4
Electrochemical	Oligonucleotide encapsulated Ag nanoclusters	100.0 fM ~ 10.0 nM	67 fM	S5
surface-enhanced Raman scattering	catalytic hairpin assembly	10.0 fM~ 100.0 nM	3.5 fM	S6
surface-enhanced Raman scattering	nuclease assisted target recycling	0.33 fM ~ 3.3 pM	42.0 aM	S7
Point-of-care testing	DNA–inorganic hybrid nanoflowers	0.5 ~ 100 nM	0.41 nM	S8
Colorimetric	DNAzyme-coupled branched hybridization chain reaction	1.0 pM ~ 1.0 nM	1.0 pM	S9
Colorimetric	DNA walker, AuNPs	0.05−10.0 pM	16.7 fM	S10
DFM	Enzyme assisted TMSD	1.0 ~ 100.0 fM	1.0 fM	This work

Reference

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