Electronic Supplementary Material (ESI) for Analyst.

Supporting Information

Au nanoparticles on two-dimensional MoS_2 nanosheets as the photoanode for efficient photoelectrochemical miRNA detection

Nina Fu,[a] Yue Hu,[a] Saihua Shi,[a] Shaokang Ren,[a] Wei Liu,[a] Shao Su,[a] Baomin Zhao,[a,*] Lixing Weng[a] and Lianhui Wang[a,*]

[a.] *Key Laboratory for Organic Electronics and Information Displays & Institute of Advanced Materials (IAM), Jiangsu National Synergetic Innovation Center for Advanced Materials (SICAM), Nanjing University of Posts & Telecommunications, 9 Wenyuan Road, Nanjing 210023.*

[b.] *School of Geophic Information, Nanjing University of Posts & Telecommunications, 9 Wenyuan Road, Nanjing 210023.*

** Corresponding author: E-mail: iambmzhao@njupt.edu.cn (BM Zhao); iamlhwang@njupt.edu.cn (LH Wang).*

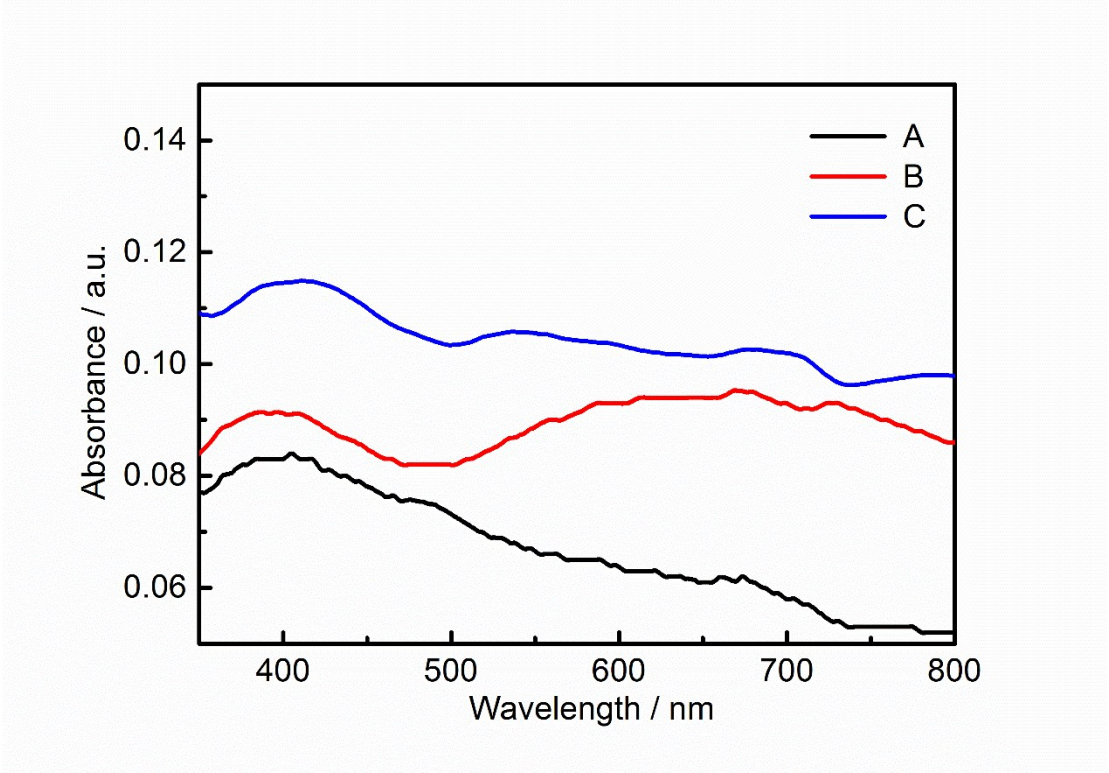

Fig S1. UV-vis spectroscopy of (A) MoS_2, (B)MoS_2-AuNPs and (C) annealed MoS_2-AuNPs on ITO slices.

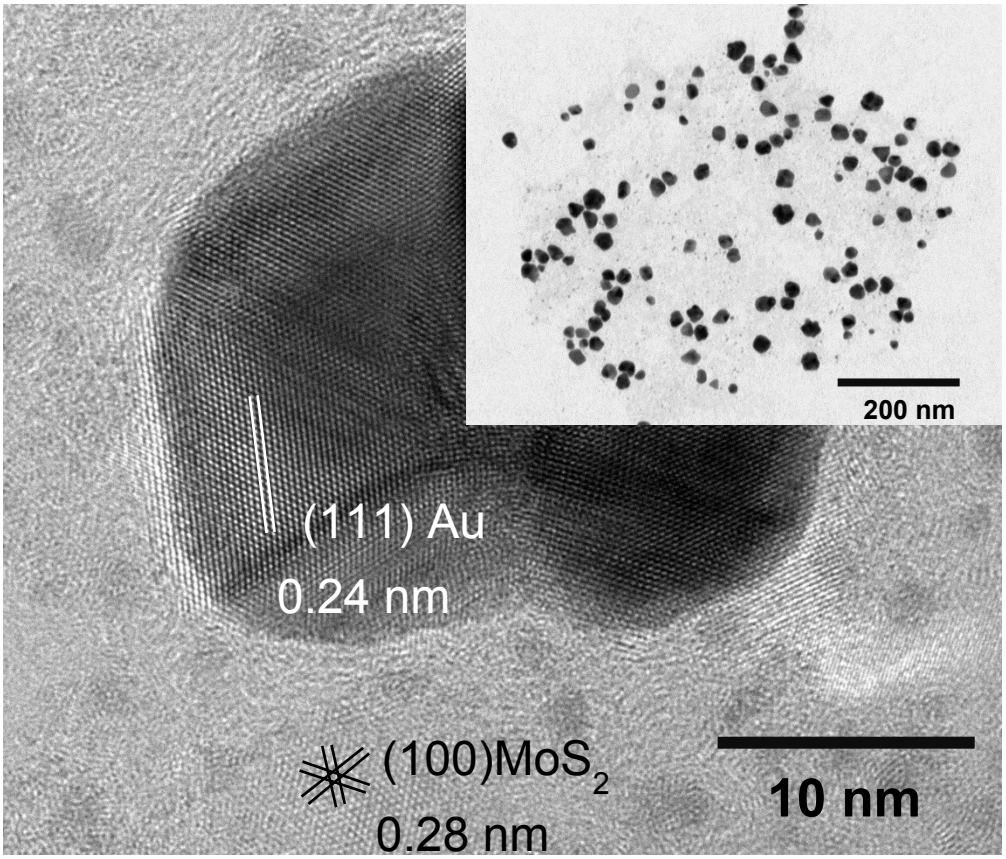

Fig S2. HRTEM image of AuNPs on MoS_2, showing the distinguishable lattice fringes for Au and MoS_2. (Inset: typical low magnification TEM image of MoS_2-AuNPs composite)

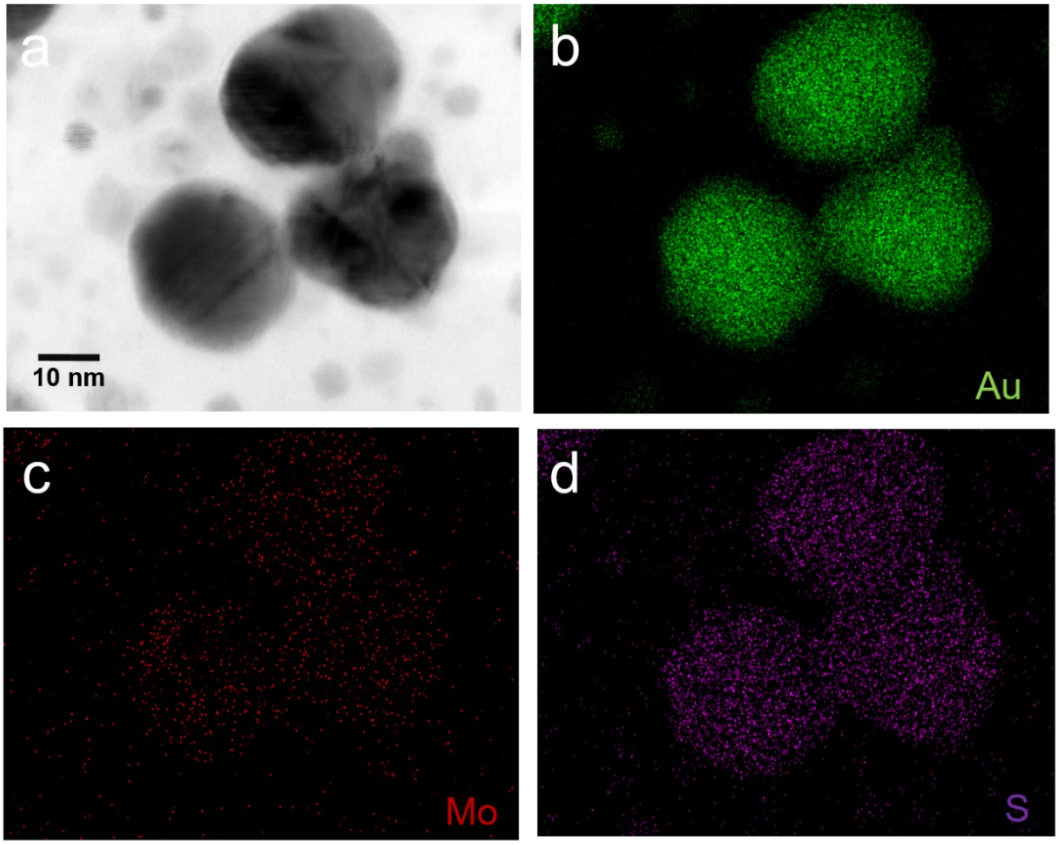

Fig S3. STEM image and (b-d) corresponding Au, Mo and S EDX mapping images of the as-prepared MoS_2-AuNPs heterojunction.

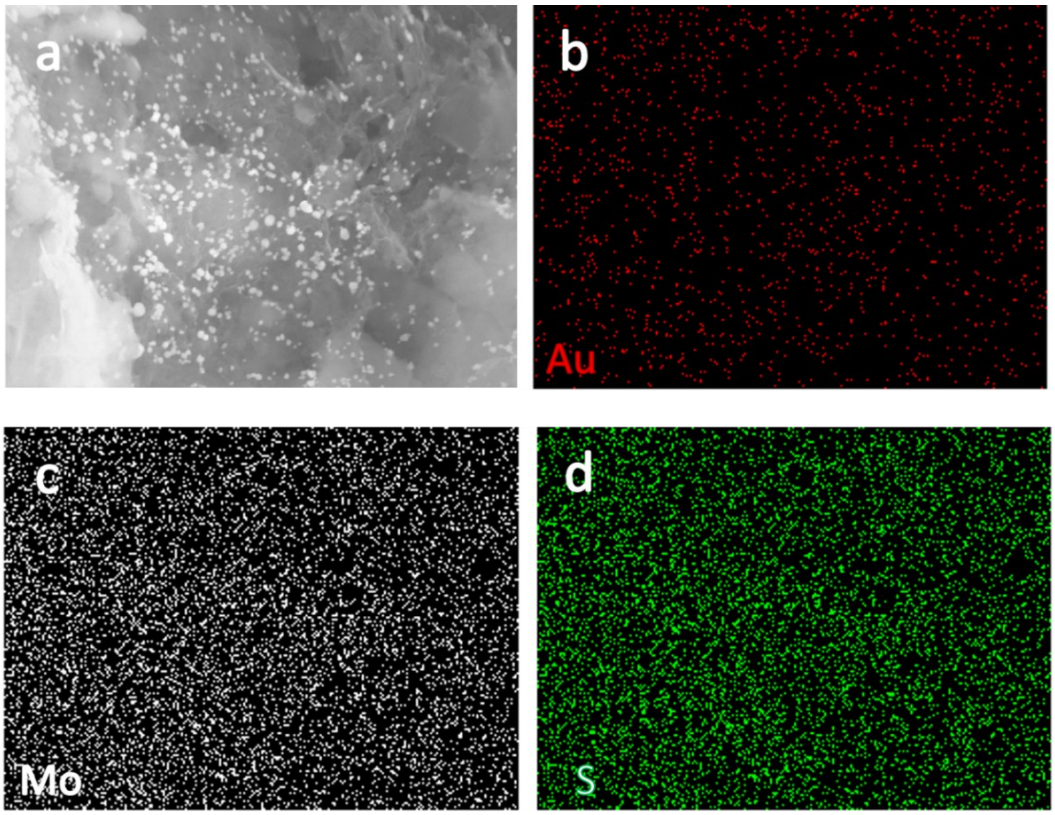

Fig.S4. SEM image (a) and corresponding Au, Mo and S (b-d) EDS mapping images of the thermally annealed MoS_2-AuNPs heterojuction.

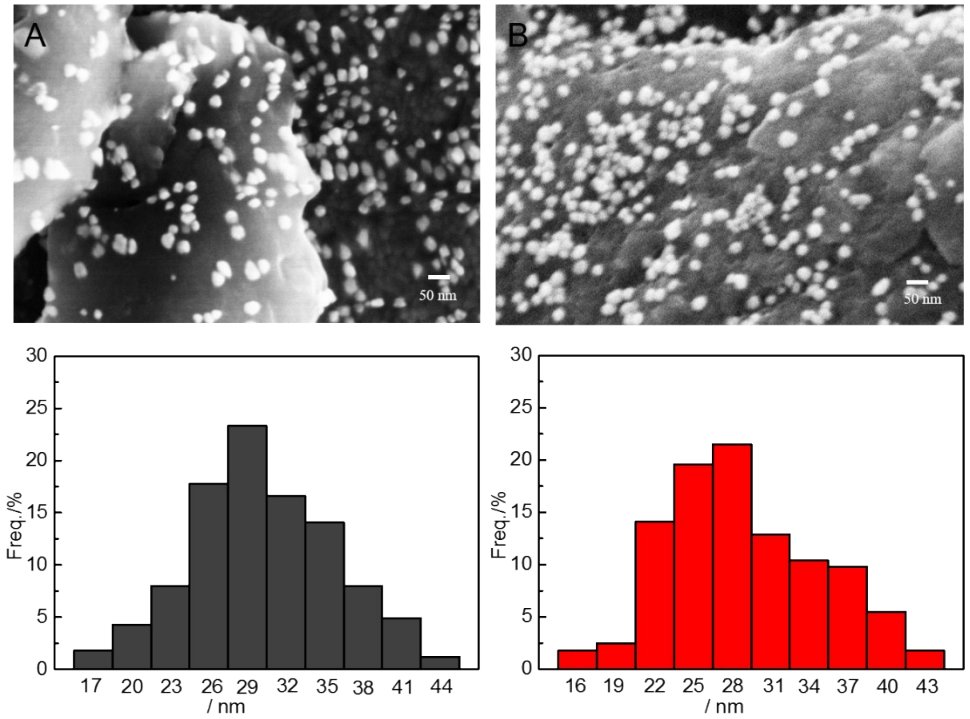

Fig. S5 Statistic analysis of MoS_2-AuNPs before (A, average grain diameter is 30.2 nm) and after (B, average grain diameter is 28.9 nm) annealed

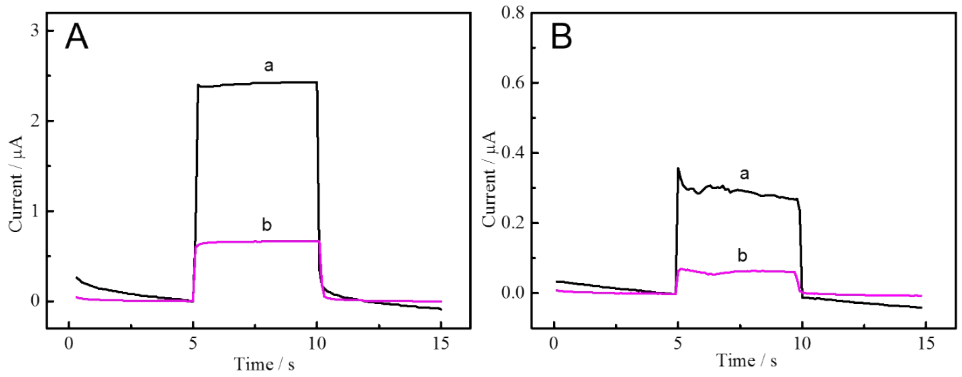

Fig. S6. (A) The photocurrent of MoS_2-AuNPs/ITO(a) and the corresponding photocurrent of streptavidin/target miRNA/biotin DNA/MoS_2-AuNPs/ITO (b) (in 0.1 M PBS containing 0.1 M AA, pH = 7.4, under 450 nm irradiation, at applied potentials of 0 V) (B) The photocurrent of MoS_2-AuNPs/ITO(a) and the corresponding photocurrent of streptavidin/target miRNA/biotin DNA/MoS_2-AuNPs/ITO (b) (in 0.1 M PBS containing 0.1 M AA, pH 7.4, under 532 nm irradiation, at applied potentials of 0 V).

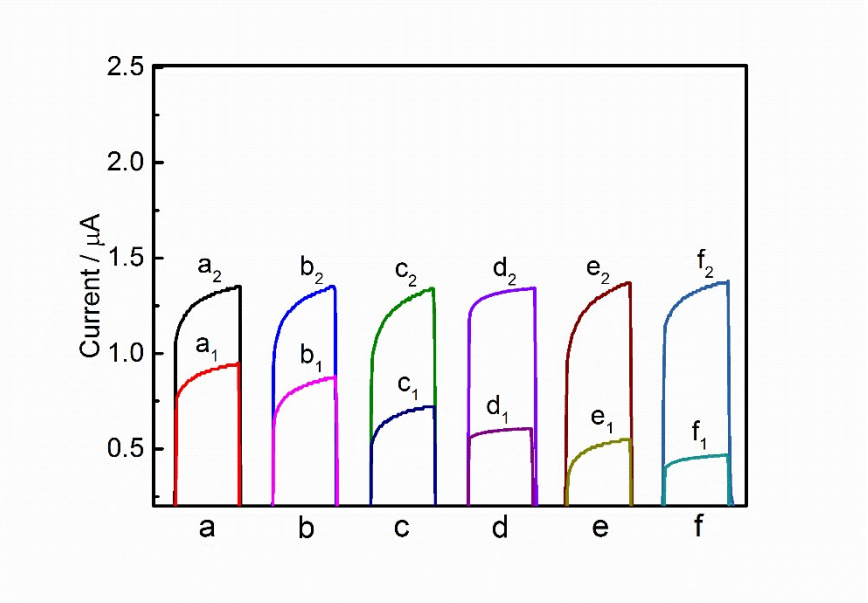

Fig. S7. Curve a_2, b_2, c_2, d_2, e_2 and f_2 are the photocurrents of biotin DNA/MoS_2-AuNPs/ITO at adverse concentrations of target miRNA (from a_2 to f_2): 10 fM, 100 fM, 1 pM, 10 pM, 100 pM and 1 nM. Curve a_1, b_1, c_1, d_1, e_1 and f_1 are the corresponding photocurrents of streptavidin/target miRNA/biotin DNA/MoS_2-AuNPs/ITO (measured in 0.1 M PBS containing 0.1 M AA, pH = 7.4, under 450 nm (89 mW / cm^2) irradiation, at applied potentials of 0 V).

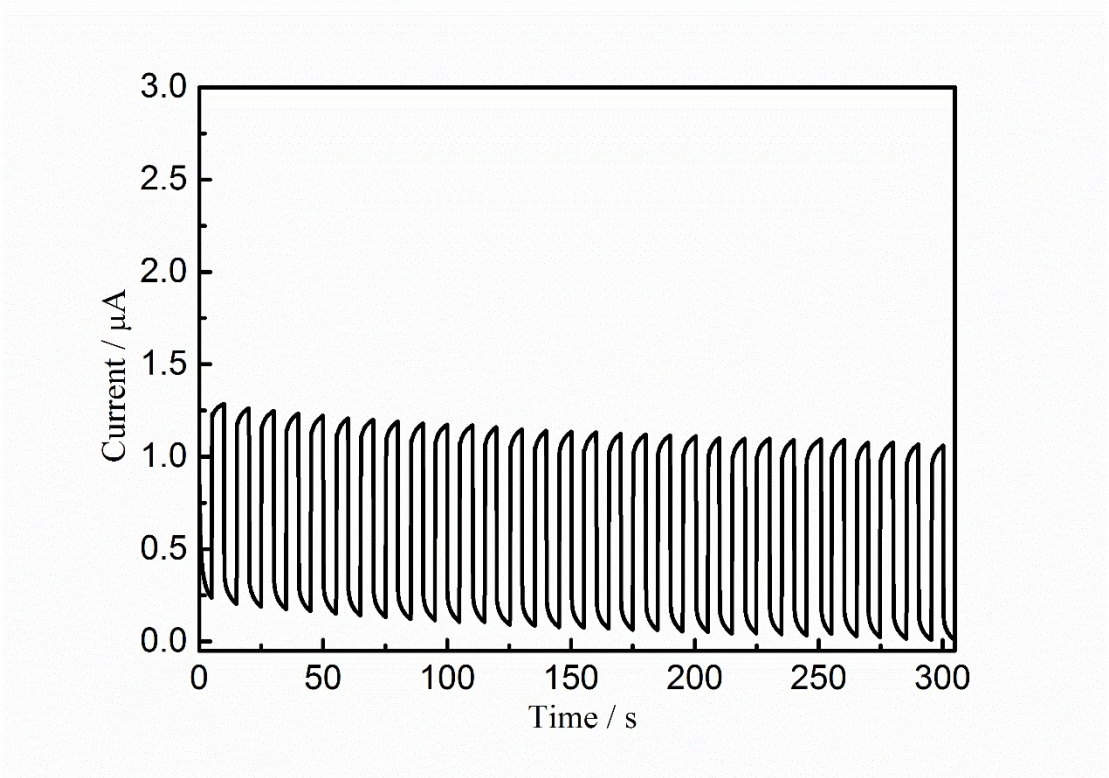

Fig. S8. The stability of the MoS2-AuNPs/ITO in the absence of miRNA, and repeatability test of turning on/off electrodes once every 10 s in 0.1 M PBS (pH = 7.4) containing 0.1 M AA.

Table S1. The recovery studies of microRNA-21 in human serum.

Sample	Added (pM)	Found (pM)	RSD(%)	Average recovery(%)
1	1	1.09, 0.95, 1.06	7.1	103.3
2	10	10.37, 10.83, 10.16	3.3	104.5
3	100	104.13, 93.11, 108.88	7.9	102.0