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In-situ growth of metal nanoparticles on boron nitride nanosheets as highly efficient catalysts

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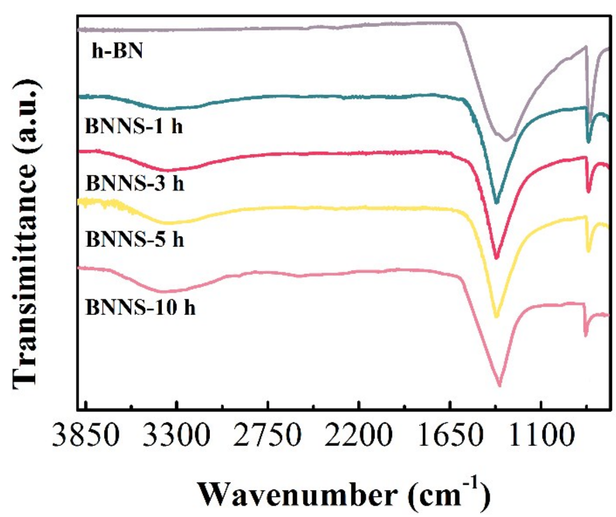

Fig. S1 FTIR spectra of pristine h-BN powder and BNNS collected after 1 h, 3h, 5h and 10h tip-sonication.

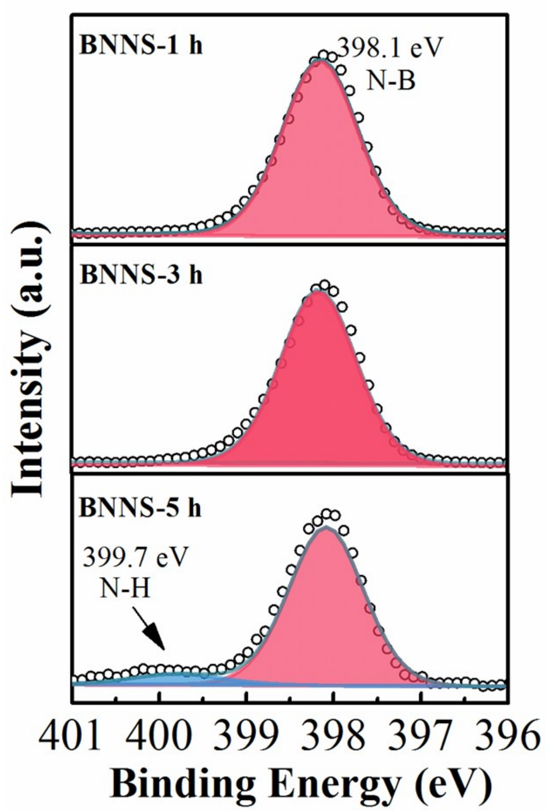

Fig. S2 N 1s narrow XPS scans of BNNS exfoliated in NaOH-water system for 1 h, 3 h and 5 h.

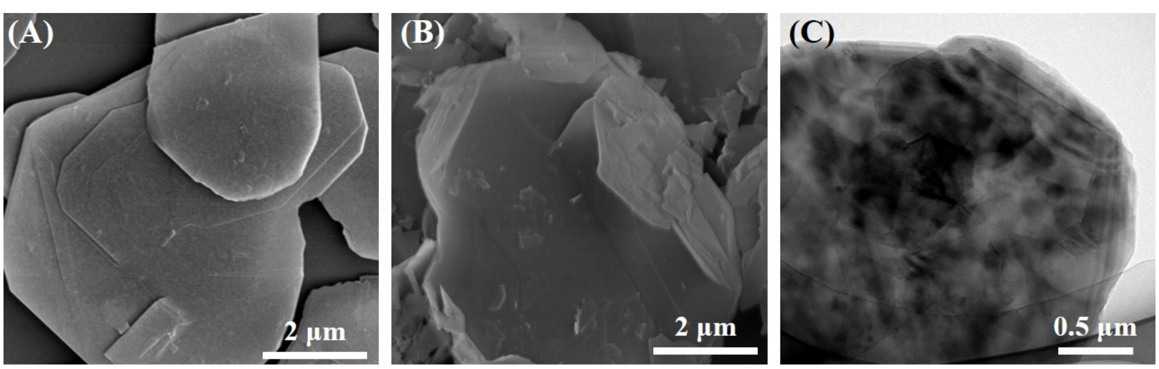

Fig. S3 SEM images of (A) pristine h-BN and (B) h-BN residue after exfoliation. (C) TEM image of pristine h-BN.

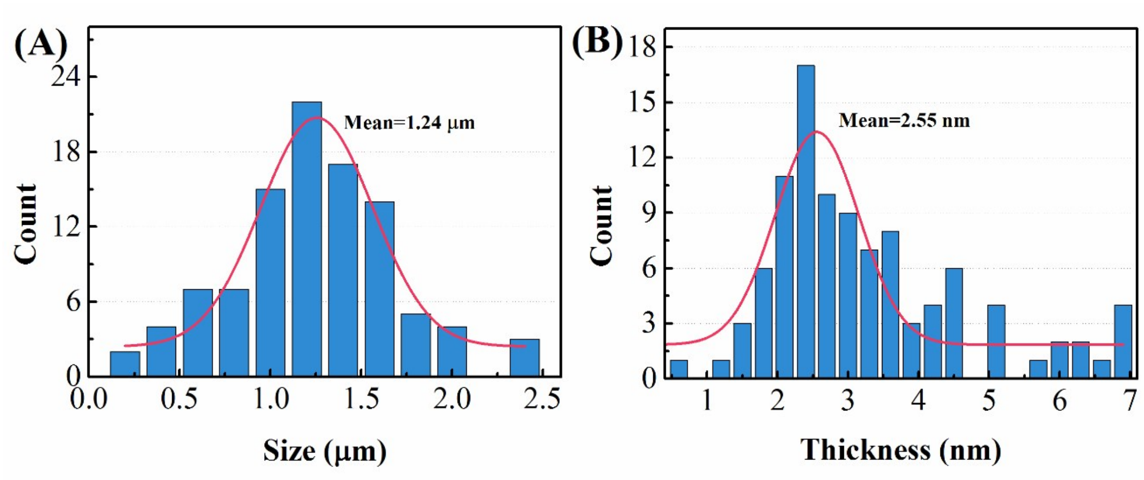

Fig. S4 (A) Lateral size distribution and (B) thickness distribution of BNNS.

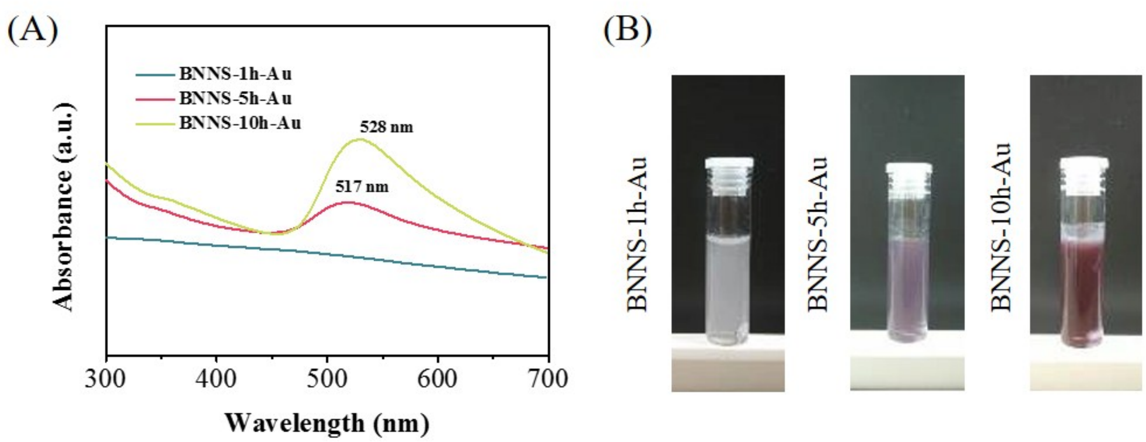

Fig. S5 (A) UV-vis spectra of BNNS, BNNS-5h-Au and BNNS-10h-Au nanocomposites. (B) Digital photos of BNNS-1h-Au, BNNS-5h-Au and BNNS-10h-Au.

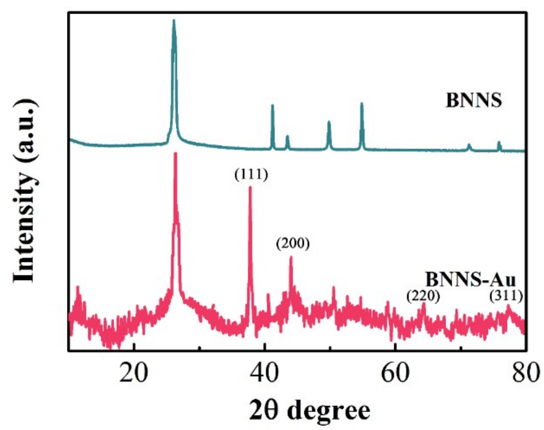

Fig. S6 XRD patterns of BNNS and BNNS-Au nanocomposite.

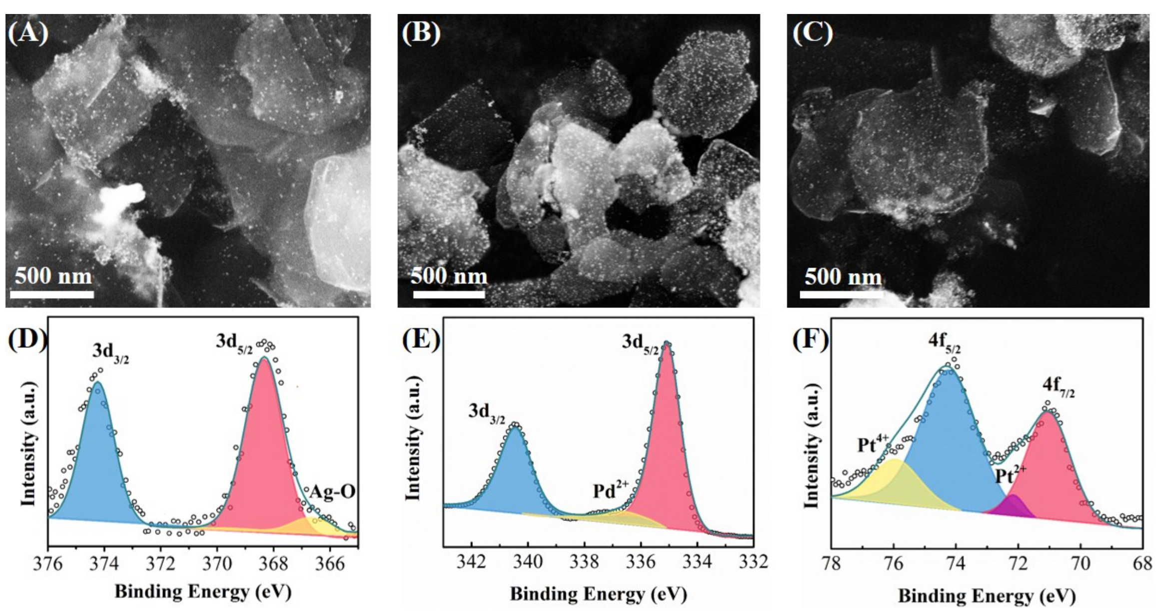

Fig. S7 SEM images of (A) BNNS-Ag, (B) BNNS-Pd and (C) BNNS-Pt nanocomposites. (D) Ag 3d narrow XPS scan of BNNS-Ag nanocomposite. (E) Pd 3d narrow XPS scan of BNNS-Pd nanocomposite. (F) Pt 4f narrow XPS scan of BNNS-Pt nanocomposite.

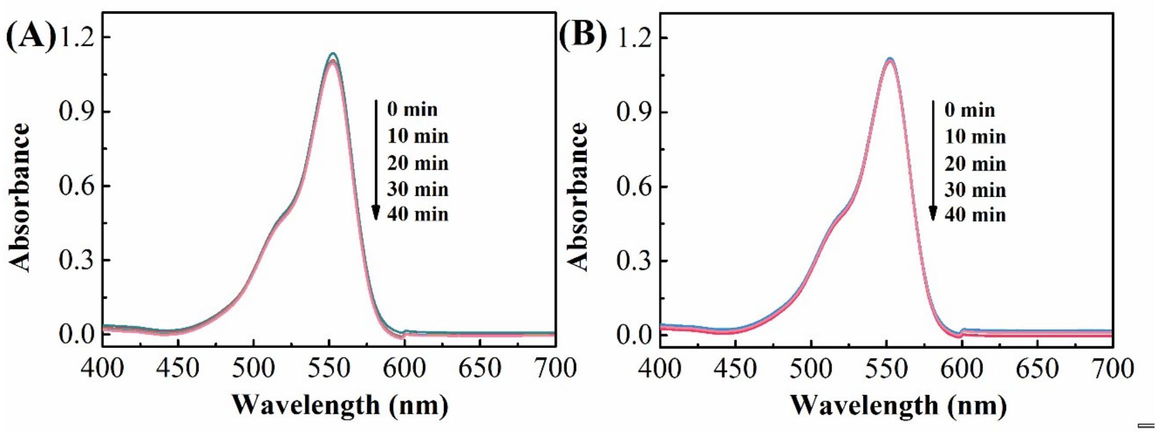

Fig. S8 UV–visible spectra of Rh B during the reduction process in the presence of (A) $NaBH_4$ and (B) BNNS+$NaBH_4$.

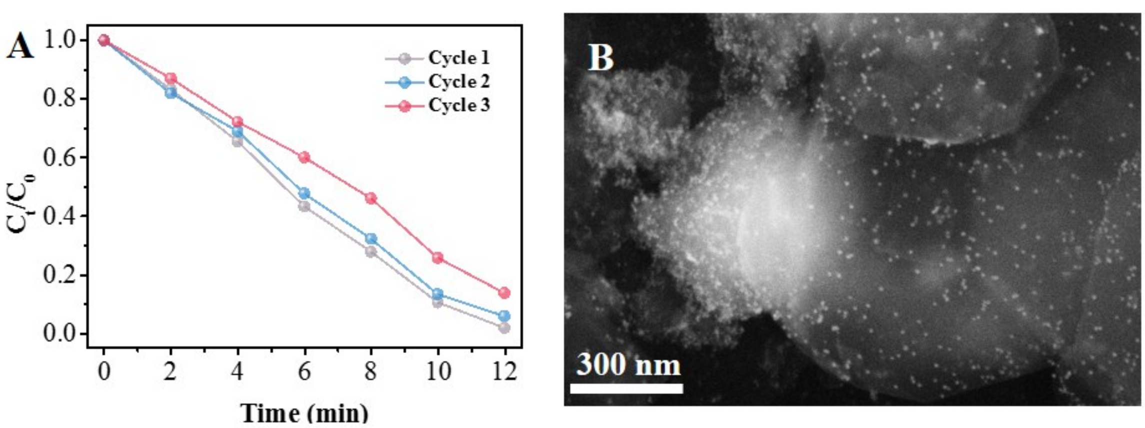

Fig. S9 (A) The catalytic performance of BNNS-Au NP composite for 3 cycles Rh B degradation. (B) SEM image of BNNS-Au NP composite after 3 cycles Rh B degradation.

Table S1 Performance comparison of the proposed BNNS-Au nanocomposite and other reported catalysts towards the reduction of RhB.

Catalyst	Rate constant (min^{-1})	Reference
Bimetallic Pt–Cu	2.7	1
Ag-Fe_3O_4	0.42	2
Polydopamine microparticles	0.328	3
Sm-doped CeO_2	0.161	4
BNNS-Au	0.064	This work

Table S2 Performance comparison of the proposed BNNS/Au/GCE and other electrodes towards the electrochemical detection of hydrazine.

Electrode	Method	LOD (μM)	Linear range (μM)	Reference
CeO_2–OMC*/GCE	I-T	0.012	0.04-192	5
Au@Pd-TiO_2 NTs*/GCE	I-T	0.012	0.06-700	6
Au@Pd-rGO*/GCE	I-T	0.08	2-40	7
rGO-ZnO/GCE	I-T	0.8	1-33500	8
DHsalophen isomers/GCE	CV	1.6	10-400; 400-4000	9
Polypyrrole NWs*-AuNPs/GCE	DPV	0.2	1-500; 500-7500	10
BNNS-Au/GCE	DPV	0.0014	0.0005-0.5; 0.5-20; 20-2500	This work

*OMC = ordered mesoporous carbon *NTs = nanotubes *rGO = reduced graphene oxide *NWs = nanowires

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