Supplementary material

Efficient cyanide sensing using plasmonic Ag/Fe_3O_4 nanoparticles

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Table 1S. Performance summary of most sensitive scientific reported cyanide sensors with significant analytical features in the literature

Method	Minimum reported LOD[b] (nmol L^{-1})	LDR[a] (μmol L^{-1})	Publish year	Ref.
Cysteamine-decorated gold nanoparticles for plasmon-based colorimetric on-site sensors using the smart-phone color ratio and for catalytic reduction of 4-nitrophenol	159	-	2023	[1]
Smartphone-Based Attomolar Cyanide Ion Sensing Using Au-Graphene Oxide Cryosoret Nanoassembly and Benzoxazolium-Based Fluorophore in a Surface Plasmon-Coupled Enhanced Fluorescence Interface	1	-	2023	[2]
Ratiometric orange fluorescent and colorimetric highly sensitive imidazolium-bearing naphthoquinolinedione-based probe	1 and 0.13 pM		2023	[3]
Synthesis of novel 3-hydroxy-2-naphthoic hydrazones as selective chemosensors for cyanide ions	8.2	-	2023	[4]
A benzoxazole-based fluorescent 'off-on-off' probe for cascade recognition of cyanide and Fe^{3+} ions	23		2023	[5]
Turn-on fluorescent and colorimetric sensor for cyanide and acetate-based Schiff base compound of 2,2′-((1E,11E)-5,8-dioxa-2,11-diazadodeca-1,11-diene-1,12-diyl)bis(4-((E)-phenyldiazenyl)phenol)	2.1		2023	[6]
Colorimetric, fluorometric, and electrochemical sensing of cyanide ion in aqueous media using merocyanine-ferrocene conjugate	UV: 2.28, fluorescence spectroscopy: 1.48, and CV: 0.61	-	2023	[7]
Fluorometric and colorimetric sensor	1.2	0–10 μL	2023	[8]

by pyridinium scaffolds: live cell imaging and real sample analysis		Not exactly mentioned		
Silicon nanoparticles as a fluorometric probe for sensitive detection of cyanide ion and its application in C. elegans bio-imaging	0.90	0 - 33	2023	[9]
Electron-deficient moiety regulated structure: an efficient strategy for the design of a highly sensitive cyanide “turn-on” fluorescent probe	58	0.025–40.0	2023	[10]
Bis-BODIPY-based fluoride and cyanide sensor mediated by unconventional deprotonation of C−H proton	83	-	2022	[11]
Fluorene based fluorescent and colorimetric chemosensors	0.07 & 0.15	0–0.1	2022	[12]
Anoptical sensor in aqueous solution and living cells with a fluorogenic naphthalene based receptor (NFS)	210	-	2022	[13]
Spiropyran and spironaphthoxazine based opto-chemical probes for instant ion detection	SPOH (91) and SNO (94)	-	2022	[14]
A robust gold nanocluster-peroxyoxalate chemiluminescence system	0.021	0.096–4.8 nM	2022	[15]
Dual anion colorimetric and fluorometric sensing of arsenite and cyanide ions involving MLCT and CHEF pathways	0.37	0-100	2022	[16]
Fluorescent lysozyme gold-aryl bioconjugates	-	1 to 12	2022	[17]
Aggregation induced emission based fluorenes as dual-channel fluorescent probes for smartphones and logic gates applications	0.50, 0.51 & 0.57	0-0.5	2022	[18]
Development of AIEE active fluorescent and colorimetric probe for the solid, solution, and vapor phase detection	6.17	-	2022	[19]
Sequential colorimetric sensor via the complexation−decomplexation mechanism based on sugar pyrazolidine-3,5-dione	480	-	2022	[20]
Selective flurogenic chemosensor for cyanide	234 & 11	-	2021	[21]
Coumarin-based chemosensor	57.9	-	2021	[22]
Fluorescence sensing based on Au-modified upconversion nanoassemblies	153	0 to 200	2021	[23]
Complexation–Decomplexation mechanism with Di(bissulfonamido)spirobifluorene for copper(II) and cyanide sensing	390	0 to 10	2021	[24]
Mercuric cation-graphene quantum	310	5.0–15.0	2021	[25]

dots for fluorescence switching detections of cyanide and ferricyanide				
Functional dye based optical sensors by Naphthalene Flanked Diketopyrrolopyrrole	500 & 50	0.05 to1 & 0.5 to 10	2021	[26]
Origami paper analytical assay based on metal complex sensor for fire survivors	400	1-100	2021	[27]
Recognition in a wide pH range by a trifluoroacetamido based metal–organic framework	280	-	2021	[28]
Tetra-imidazole functionalized pyrene for constructing Co-MOF and cyanide sensing	89.3	0-27	2021	[29]
Rational design of an ICT-based chemodosimeter with aggregation-induced emission for colorimetric and ratiometric fluorescent detection	17	0 to 20	2021	[30]
An imine based probe for fluorescent cyanide sensing with red-emission in solid and solution phases	500	0 to 25	2021	[31]
A sensitive and selective BINOL based ratiometric fluorescence sensor	189	0-20	2021	[32]
Gold nanoparticles-decorated paper-based sensor for rapid cyanide detection in water	7680	-	2021	[33]
A flexible salamo-based colorimetric and proportional chemical sensor	128	0-20	2021	[34]
“OFF-ON” fluorescence bisphenol–based cyanide sensing	380	0–60	2021	[35]
Controllable and reversible sensing cyanide ion using dual-functional Cu (II)-based ensemble	In order of nM	0–2500 0–1800	2021	[36]
Aggregation-induced emission-based material	67		2021	[37]
A chemosensor derived from benzamide hydrazones	2150-5837	2.15 to 17.5	2020	[38]
Cyanide chemosensors based on 3-dicyanovinylpyrazolo [1, 5-a] pyrimidines: effects of peripheral 4-anisyl group substitution on the photophysical properties	300 in DPPa to 170 in DPPc	-	2020	[39]
Visual and colorimetric detection based on the morphological transformation of gold nanobipyramids into gold NPs	1.58	1 -15	2020	[40]
Rationally designed imidazole derivative as colorimetric and fluorometric sensor	5300 & 41	-	2020	[41]
Multi-Stimuli Responsive FRET Processes of BiFluorophoric AIEgens in an Amphiphilic Copolymer	260	0-80	2020	[42]
A coumarin-connected carboxylic indolinium sensor for cyanide detection	4.44×10^5	-	2020	[43]

Rapid ‘color to concentration’ cyanide quantification using paper-based sensing chip	860	0−20	2020	[44]
Electrochemical Sensor Based on Silver Nanoparticles/Multi-walled Carbon Nanotubes Modified Glassy Carbon Electrode	4	0.1 to 210	2020	[45]
Ratiometric sensing using dual-emissive Au nanoclusters	10	0.02-1	2020	[46]
Phenothiazine-based visual and fluorescent sensor	11	-	2020	[47]
turn-off fluorescent detection using dicyanovinyl-substituted phenanthridine fluorophore	39.3	2-5	2020	[26]
Sensing of aluminum and cyanide ions utilizing a bis-phenol a based fluorogenic probe	4.81	-	2020	[48]
Spontaneous optical response by a reactive binding site probe	9.28 & 0.61	-	2020	[49]
ON–OFF” optical sensor based on hydrogen bonding and water assisted aggregation induced emission	8.2	Up to 0.21	2020	[50]
Triphenylamine-thiophene dyad as a Chemodosimeter	42.4	1–100	2020	[51]
Stepwise assembly of turn-on fluorescence sensors in multicomponent metal–organic frameworks	50	0 to 2.67	2020	[52]
On-site detection by colorimetric and fluorogenic sensors: Smartphone and test strip applications	450	5 to 35	2020	[53]
Aryl Ethynylpyrene as fluorescent sensor	66 & 87	-	2020	[13]
turn-off fluorescent detection using dicyanovinyl-substituted phenanthridine fluorophore	39.3	2 to 5	2020	[26]
Fluorescence “turn-ON” nanosensor using supramolecular hybrid of graphene quantum dots and cobalt pyrene-derivatized phthalocyanine	0.5	0.01-0.05	2019	[54]
Sensor based on anion–π interaction-driven electron transfer	870	0 to 20	2019	[55]
Furan/thiophene-based fluorescent hydrazones as fluoride and cyanide	1075	-	2019	[56]
A dual-mode sensor for colorimetric and turn-on fluorescent detection	226	0-100	2019	[57]
A carbazole-based colorimetric and fluorescent sensor with aggregation induced emission	67.4	0-10	2019	[41]
A colorimetric and ratiometric fluorescent probe	339	2-12	2019	[58]
A colorimetric and fluorometric oligothiophene-indenedione-based sensor	31.3	0-10	2019	[59]
A turn-on fluorescent chemosensor	350	-	2019	[60]

based on aggregation-induced emission				
Stimuli-responsive gold nanoparticles modified with poly (N,N-dimethylaminoethyl methacrylate)	0.0047	10^{-5}-10^{-3} & 0.04–320	2019	[61]
Dicyanovinyl-substituted D-A type dithienylethenes: Synthesis, photochromism and colorimetric sensing	250	-	2019	[62]
Fluorescence turn-on chemodosimetric sensing by cyanovinylterpyridine modified phthalonitrile and subphthalocyanine	94	-	2019	[63]
A mitochondria-targeted ratiometric fluorescent probe	0.17	0 to 18	2019	[64]
Colorimetric and fluorometric chemosensors for cyanide detection via ICT off in aqueous solution	3600 & 4200 500 & 600	-	2019	[65]
An easy to make chemoreceptor for ratiometric fluorescent detection in food	0.96 mM	Up to 160 mM	2019	[66]
Colorimetric sensor with an organic probe	195	-	2019	[67]
A coumarin chalcone compound as red fluorescent probe	0.31	-	2018	[68]
nucleophilic addition and hydrogen-bond interaction	3 & 9.8	Up to 0.01 & 0.033	2018	[69]
Paper-based headspace extraction combined with digital image analysis	26.92	0.11-3.85	2018	[70]
Copper NPs as a fluorescent probe	370	0.5-18	2017	[71]
Nitrogen and sulfur co-doped graphene quantum dots for an inner filter effect-based cyanide sensor	520	10-500	2017	[72]
Electrochemical sensor by gold NPs decorated carbon ceramic electrode	90	0.5-14	2017	[73]
Fluorescence sensor which in turn inhibit 2-way ESIPT	600	-	2017	[74]
Photoluminescent copper nanoclusters	5	-	2017	[75]
Glassy carbon electrode modified with graphene oxide and titanium dioxide probe	100	0.1-60	2017	[76]
Cyanide Mapping via Surface Plasmon Spectroscopy of Single Au–Ag Nanoboxes	1	Up to 40 nM	2017	[77]
Bimetallic gold-silver nanoclusters sensor	138	0.005-10 & 20-50	2017	[78]
Nano biosensor by Ag@Au core–shell nanoparticle (NP)/iridium(III) complex-based sensing platform	36	0.05-80	2017	[79]
IR 786 perchlorate (IR-786) as an optical sensor in organic media and on solid surfaces	500	0.5-8	-2016-	[80]
on-off ratiometric fluorescence probe based on perturbation of the interaction between gold nanoclusters	75	0.1–220	2016	[81]

and a copper (II)-phthalocyanine complex				
Water-soluble fluorescent probe	17	0.2–15	2016	[82]
Gold nanodots probe	150	0.29 -8.87	2016	[83]
Spectrophotometric by Improved ninhydrin-based reagent	308	0.78- 15.38	2016	[84]
An NIR molecule-based "On–Off" fluorescent and colorimetric Sensor	0.46	6-20	2016	[85]
Nano-sized imprinted polymer synthesis for carbon nanotube impregnated carbon paste electrode sensor	8000	10–100000	2016	[86]
Chemiluminescence sensor by gold NPs	13.6	0.017 – 1.33	2016	[87]
Gold NP-based dual fluorescence–colorimetric sensor	100	0-50	2016	[88]
Rapid turn-on fluorescence sensor	19.6	-	2016	[89]
Displacement of the glutathione ligand of (GSCbl) by cyanide	1000	1–20	2016	[90]
Dicanovinyl-based colorimetric and fluorescent sensor	14	Up to 5	2016	[91]
Colorimetric method by Ag@Au core–shell NPs	160	0.4-32	2016	[92]
Hexagonal cadmium oxide nanodisks as efficient scaffold	1400	10–80	2016	[93]
Amperometric inhibition biosensors	30	0.1–58.6	2015	[94]
Conductometric sensor using imidazole based receptor	10	0.01-1	2015	[95]
Probe based on Ag/Fe_3O_4 NPs	1.54	0.005-0.05& 0.05-2.31	2015	[96]
Improved Ag/Fe_3O_4 NP sensor	~0.4	0.001 to 160		This work

[a] Linear dynamic range, [b] Limit of detection

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