Supplementary Materials for

Respiratory Monitoring by Ultrafast Humidity Sensors with Nanomaterials: A Review

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Table S1. Recent literature reporting fast-response humidity sensors for respiratory monitoring plotted in Figure 16(a). RH: relative humidity. R_n: resistance of nanomaterial film. C_n: capacitance of nanomaterial film. R_w: ionic resistance of adsorbed water molecular layer.

Materials	Type	Response time (s)	Recovery time (s)	RH change	Reference
graphene oxide	resistance (R_n)	0.03	0.03	40-75%	S. Borini, ACS Sens. 2013.[1]
supramolecular nanofibers	resistance (R_n)	0.008	0.024	5-80%	U. Mogera, Sci. Rep. 2014.[2]
supramolecular ionic material	resistance (R_n)	0.037	0.1	0-11%	H. Yan, Anal. Chem. 2017.[3]
carbon nanocoil	resistance (R_n)	1.9	1.5	0-16%	J. Wu, ACS Appl. Mater. Interfaces 2019.[4]
MXene nanosheet/polyelectrolyte multilayer	resistance (R_n)	0.11	0.22	20-40%	H. An, ACS Appl. Nano Mater. 2019.[5]
nanoporous cellulose nanofiber/carbon nanotube/paper fiber	resistance (R_n)	321	435	11-95%	P. Zhu, ACS Appl. Mater. Interfaces 2020.[6]
PEDOT:PSS micron line	resistance (R_n)	0.86	0.59	42-69%	G. Wang, RSC Advances 2020.[7]
tunnel-cracked nickel@polyurethane sponge	resistance (R_n)	0.8	3.6	10-70%	Q. Wang, Sens. Act. B 2021.[8]
MXene/chitosan-quercerin multilayer	resistance (R_n)	0.75	1.6	1-90%	X. Li, Sens. Act. B 2021.[9]
nafion	resistance (R_i)	0.04	0.03	0-98%	P. Kuban, Anal. Chem. 2004.[10]
porous SnO_2	resistance (R_i)	200	8	2-97%	V. Solanki, ACS Appl. Mater. Interfaces 2017.[11]
silicon nanocrystal	resistance (R_i)	12	2	20-95%	S. Kano, ACS Sens. 2017.[12]
WS_2 nanosheet	resistance (R_i)	5	6	35-40%	H. Guo, Nanoscale 2017.[13]
silica nanoparticle	resistance (R_i)	31.4	6.5	30-84%	S. Kano, ACS Sust. Chem. Eng. 2018.[14]
$NiPS_3$ nanosheet	resistance (R_i)	3	3	0-32%	R. N. Jenjeti, J. Mater. Chem. A 2019.[15]
Ti_3C_2/Ag hybrid composite	resistance (R_i)	0.08	0.12	5-95%	N. Li, Nanoscale 2019.[16]
cellulose (paper)	resistance (R_i)	472	19	7.2-91.5%	Z. Duan, ACS Appl. Mater. Interfaces 2019.[17]
polyelectrolyte (PDMS, PPDS)	resistance (R_i)	0.29	0.47	33-95%	J. Dai, ACS Appl. Mater. Interfaces 2019.[18]

MoO_3 nanosheet	resistance (R_i)	0.3	0.5	0-40%	J. Yang, Small 2019.[19]
gel polymer (MPOSS-PIL)	resistance (R_i)	0.19	0.3	11-95%	J. Dai, Sens. Act. B 2020.[20]
polyacrylic acid	resistance (R_i)	1.2	0.6	11-95%	J. Dai, Sens. Act. B 2020.[21]
50-nm silica nanoparticle	resistance (R_i)	2.8	2.3	30-70%	S. Kano, Sensors 2020.[22]
SnS_2 nanoflower/reduced graphene oxide	resistance (R_i)	4	3	0-33%	D. Zhang, Nano Energy 2020.[23]
Au nanoparticle modified TiO_2	resistance (R_i)	58	64	11-95%	S. Yu, Ceramics International 2021.[24]
glycidyl trimethyl ammonium chloride modified cellulose	resistance (R_i)	25	188	11-95%	X. Guan, Sens. Act. B 2021.[25]
coolmax/graphene oxide functionalized textile	resistance (R_i)	0.5	0.6	45-80%	L. Xu, Chem. Eng. J. 2021.[26]
graphite carbon nitride/zinc oxide	resistance (R_i)	22	5	11-95%	S. Yu, Sens. Act. B 2021.[27]
Pb/HNb_3O_8	resistance (R_i)	0.2	3	30-96%	Y. Lu, Nanoscale Horiz. 2021.[28]
Fe_2O_3-reduced graphene oxide nanohybrid	resistance (R_i)	0.8	0.8	5-97%	A. Kumar, J. Mater. Chem. C 2021.[29]
SnS_2 nanoflower/Zn_2SnO_4 hollow sphere	capacitance (C_n)	18	1	0-97%	D. Zhang ACS AMI 2018.[30]
polyester fiber	capacitance (C_n)	3.5	4	6-33%	L. Ma, Adv. Func. Mat. 2019.[31]
In_2O_3 nanocube/graphene oxide nanosheet	capacitance (C_n)	15	2.5	0-43%	B. Li, Sens Act B 2019.[32]
$CsPb_2Br_5/BaTiO_3$	capacitance (C_n)	2	2	30-80%	M.-Y. Cho, ACS Appl. Mater. Interfaces 2021.[33]
reduced graphene oxide/WS_2 heterojunction	capacitance (C_n)	0.56	2.26	12.5-85.2%	L. Zhang, Sens. Act. B 2021.[34]
PDDA/PSS layers	light	0.035	0.95	45-90%	L. Yu, Mater. Horiz. 2017.[35]
agarose coated fiber	light	0.05	0.7	60-90%	J. Mathew, Sens. Act. A 2012.[36]
titania microsphere	light	0.02	0.038	20-90%	S. Mohd-Noor J. Mater. Chem. A 2019.[37]
gold nanomembrane with optical fiber	light	0.156	0.277	11-30%	B. Du, Opt. Lett. 2020.[38]

yolk-shell titania microsphere	light	0.013	0.028	20-90%	N. Jarulertwathana, ACS Appl. Mat. Interfaces 2021.[39]
In_2O_3 quantum dots	frequency (QCM)	14	16	0-75.3%	H. Kan, RSC Advances 2019.[40]
bismuth oxychloride	frequency (QCM)	5.2	4.5	11.3-84.3%	Q. Chen, ACS Omega 2020.[41]
gel polymer (MPOSS-PIL)	frequency (QCM)	8.5	0.46	11-95%	J. Dai, Sens. Act. B 2020.[20]
hematoporphyrin-lithium niobate	frequency (SAW)	0.8	0.7	13-26%, 33-26%	R. Rimeika, Sens. Act. B 2009.[42]
graphene/polyvinyl alcohol/SiO_2	frequency (SAW)	24	14.4	0-70%	Y. Su, Sens. Act. B 2020.[43]
graphene oxide with oxygen-containing group gradient	voltage	3	3	variation=30 %	F. Zhao, Adv. Mater. 2015.[44]
TiO_2 nanowire network	voltage	10	150	10-85%	D. Shen, Adv. Mater. 2018.[45]
porous polydopamine with hydroxyl group gradient	voltage	0.22	0.26	5-55%	L. Li, Nano Lett. 2019.[46]
polypyrrole/melamine aerogel	voltage	1.1	4.5	50-75%	X. Li, IEEE Sens. 2021.[47]

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