Electronic Supplementary Information

Plasmon induced enhancement of surface phonon and magnon properties of NiO nanoparticles: Raman spectral probe

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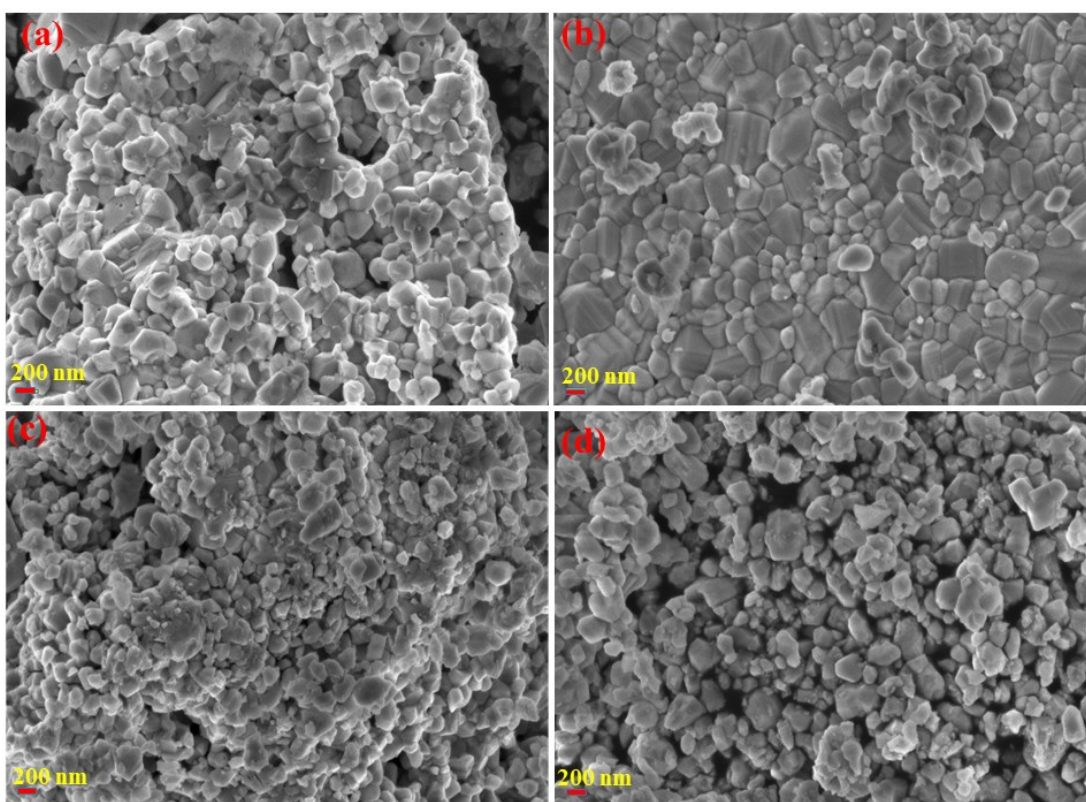
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Fig S1. FE-SEM images of prepared NiO nanoparticle with different Ag doping concentrations such as (a) Pure(PNiO), (b) 1% (1AgNiO), (c) 3% (3AgNiO) and (d) 5%(5AgNiO) with a scale bar of 200 nm.

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(a)

Element	Weight %	Atomic %
C K	7.00	16.50
O K	30.01	53.12
Ni K	62.99	30.38
Total	100	100

Full Scale 1878 cts Cursor: 0.000

(b)

Element	Weight %	Atomic %
C K	4.75	13.12
O K	22.17	45.94
Ni K	71.79	40.54
Ag L	1.28	0.39
Total	100	100

Full Scale 1136 cts Cursor: 0.000

(c)

Element	Weight %	Atomic %
C K	5.70	14.18
O K	28.54	53.30
Ni K	61.68	31.39
Ag L	4.08	1.13
Total	100	100

Full Scale 1600 cts Cursor: 0.000

(d)

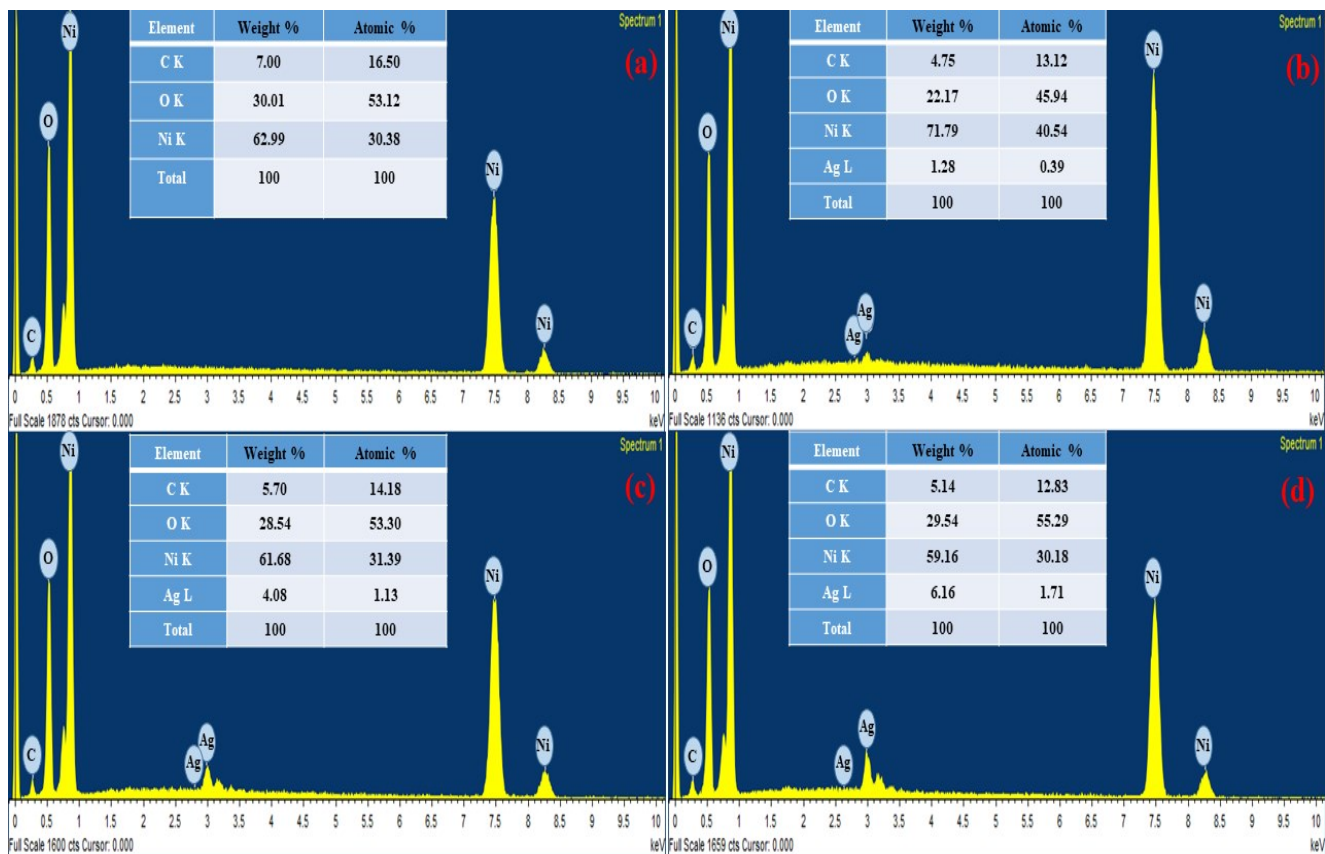| Element	Weight %	Atomic %
C K	5.14	12.83
O K	29.54	55.29
Ni K	59.16	30.18
Ag L	6.16	1.71
Total	100	100

Full Scale 1659 cts Cursor: 0.000

Fig S2. EDS spectra of NiO nanoparticles such as (a) PNiO, (b) 1AgNiO, (c) 3AgNiO, (d) 5AgNiO with different Ag doping concentration. The Atomic and weight percentage of Ni, O and Ag of each samples are shown in the inset table.
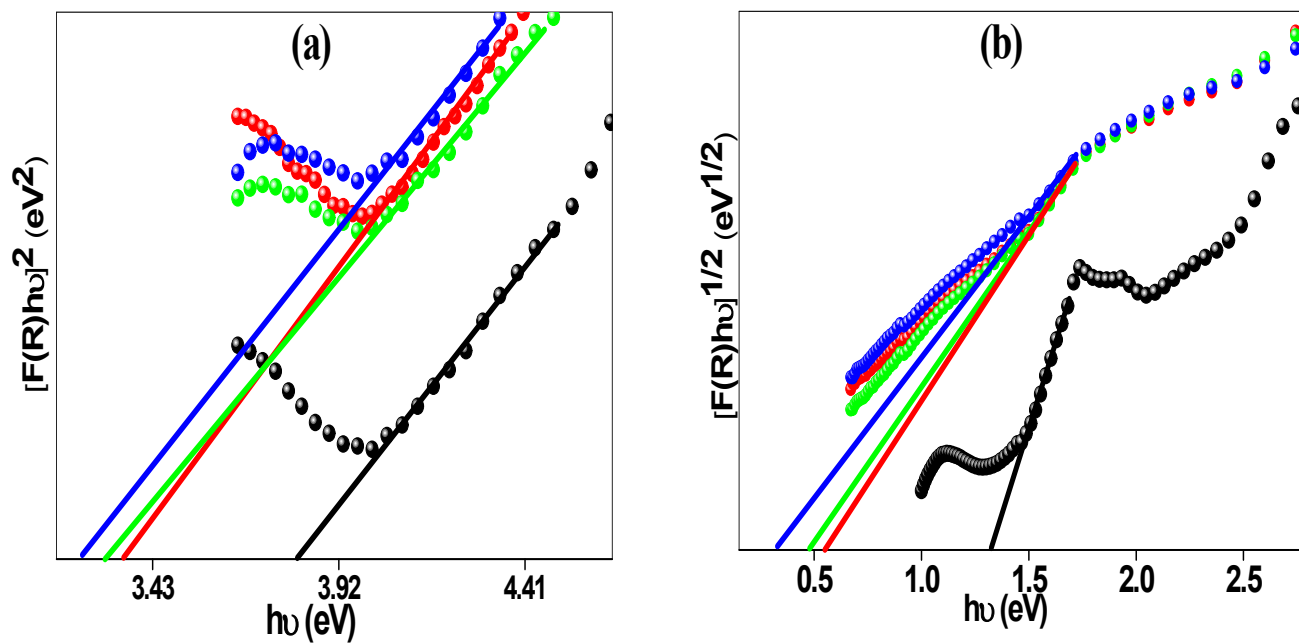
Fig S3. The Kubelka-Munks plot to determine the (a) direct and (b) indirect band gap of pure and Ag doped NiO nanoparticles.. The band gaps of the material were reduced due to the charge transfer from Ag to NiO.

Sample code	TO		SO				LO	
	Centre	fwhm	ω_{SO}	ω'_{SO}	Difference	fwhm	Centre	fwhm
	cm^{-1}	cm^{-1}	cm^{-1}	cm^{-1}	$(\omega_{SO}) - (\omega'_{SO})$	cm^{-1}	cm^{-1}	cm^{-1}

					cm^{-1}			
PNiO	395.90	136.99	458.97	531.92	72.95	39.41	527.87	100.06
1AgNiO	384.03	114.29	461.34	515.97	54.63	75.36	527.08	94.99
3AgNiO	371.22	108.95	458.76	498.76	40	84.64	521.098	89.74
5AgNiO	350.02	41.39	458.72	470.27	11.55	74.84	520.25	84.33

Table S1. FWHM and peak centres of first order phonon modes (TO, SO, and SO) in Raman spectra of prepared samples.

Sample code	H$_{SEB}$ (Oe)	M$_{VS}$ (emu/g)
PNiO	-30.46	-0.012
1AgNiO	-9.11	-0.0053
3AgNiO	-10.71	-0.0138
5AgNiO	-8.37	-0.0373

Table S2. Variation of spontaneous exchange bias effect (H$_{SEB}$) and vertical shift (M$_{VS}$) with Ag doping concentration.