Supplementary Information (SI) for Journal of Materials Chemistry C.
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Supporting information

Nickel-Doped VS_4 Nanostructures as a Promising Candidate for Nonlinear Optical Limiter

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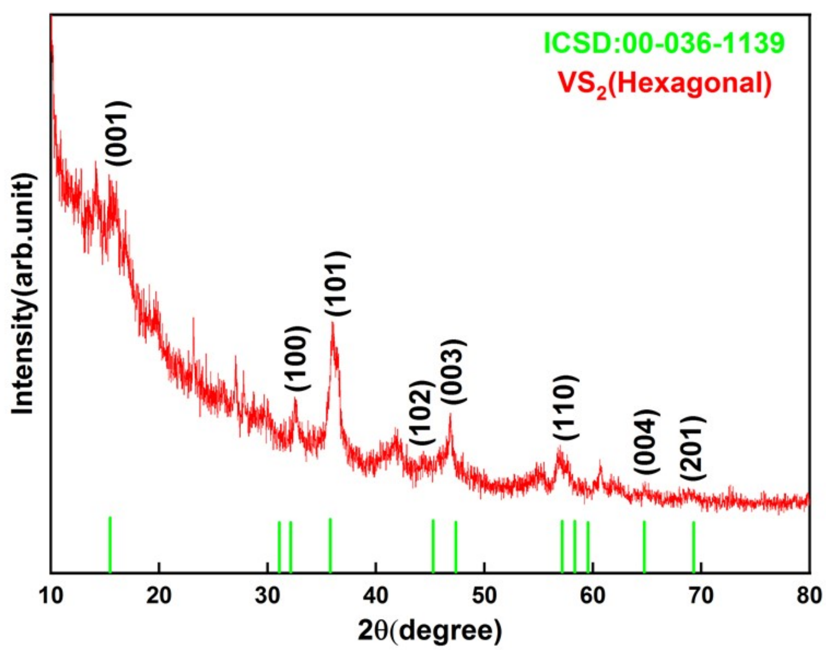

Figure S1: XRD pattern of VS_2.

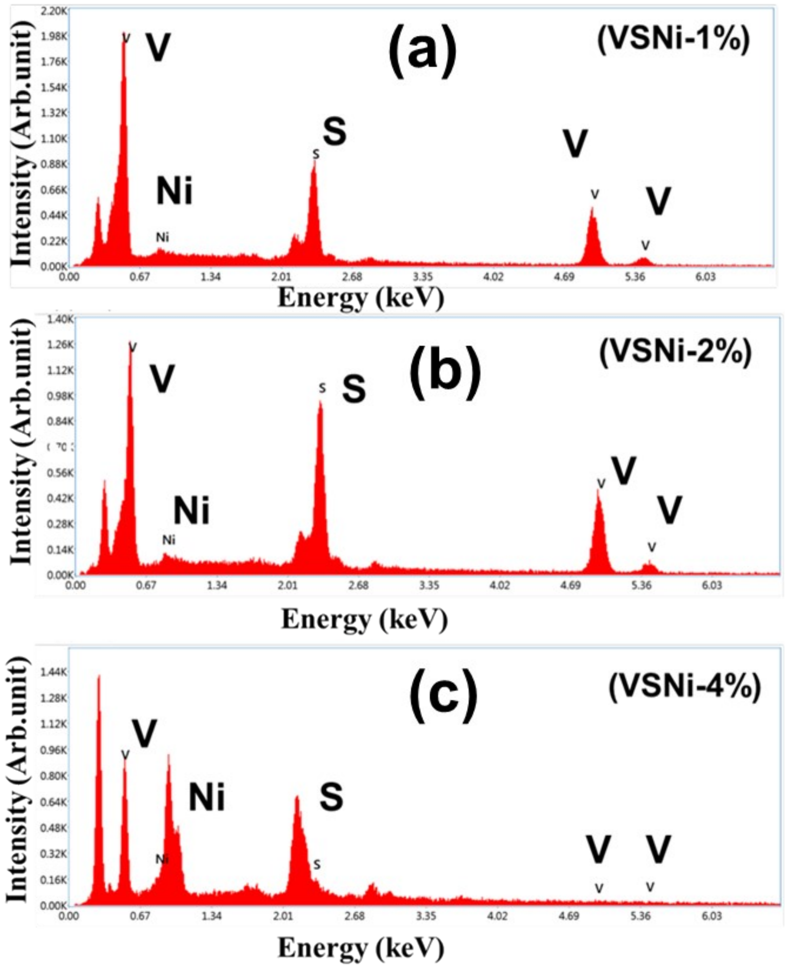

Figure S2. EDX spectra of (a) VSNi-1%, (b) VSNi-2% and, (c) VSNi-4%.

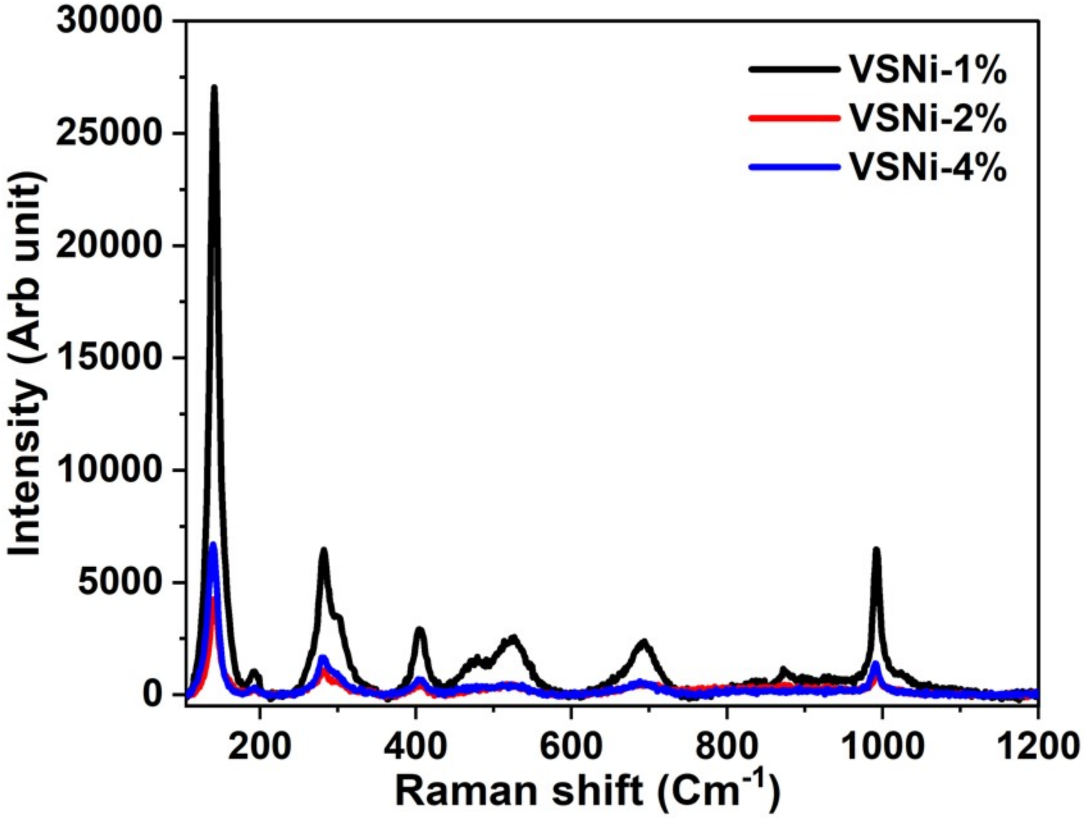

Figure S3 Raman spectra (Peak broadening)

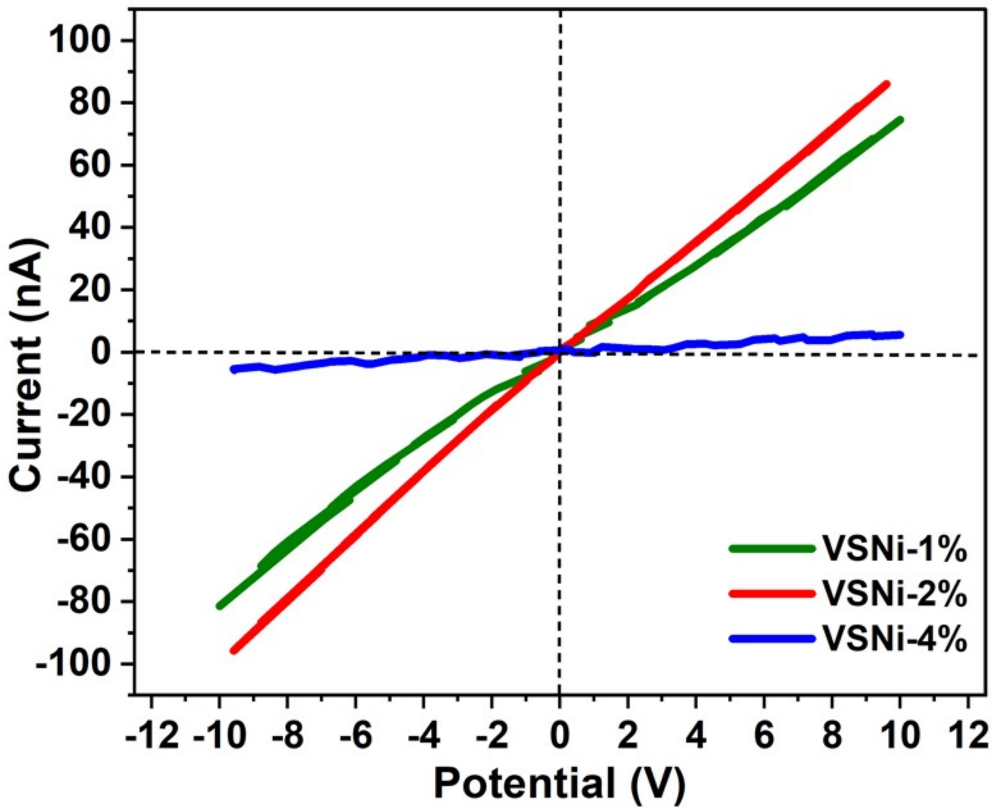

Figure S4 IV plot of VSNi-1%, VSNi-2% and VSNi-4% sample.

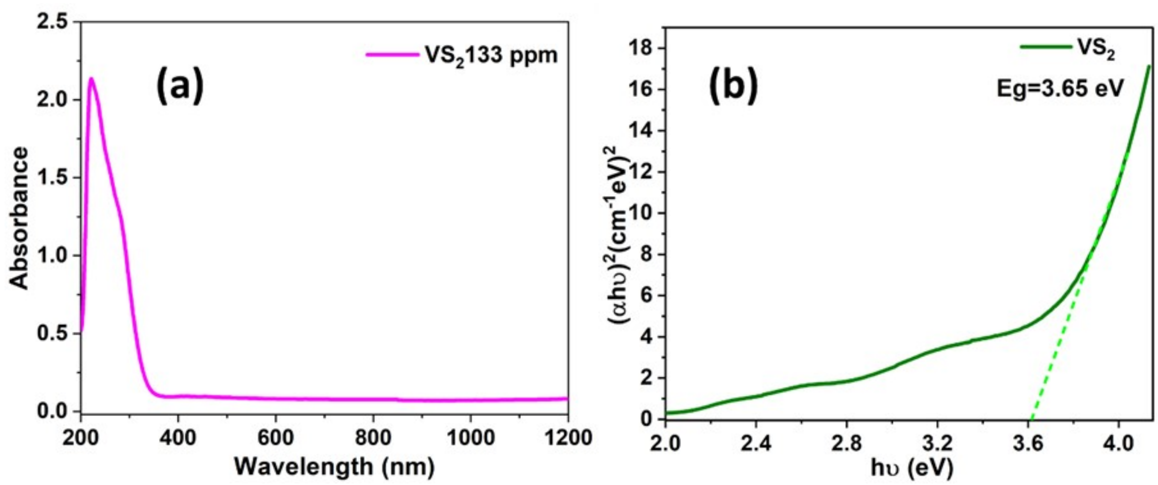

Figure S5 (a) Absorbance plot, (b) Tauc plot.

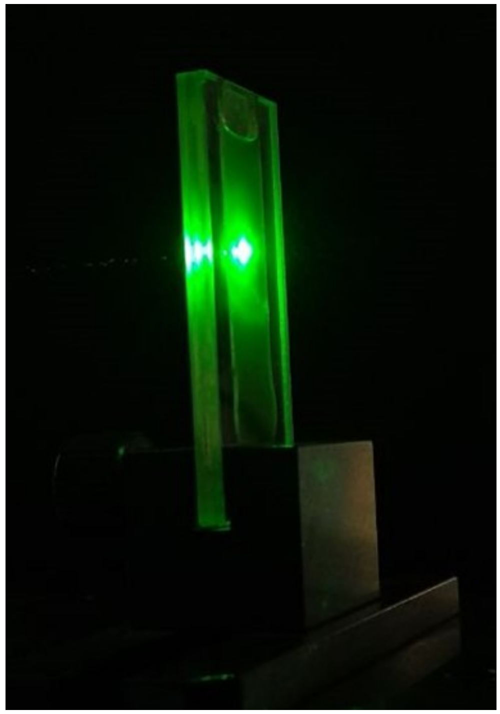

Figure S6 (Sample taken in 1mm cuvette)

Table S1 (Nonlinear comparison table for previously reported journal)

Sample name	**Synthesis method**	**Laser source**	**β (cm/GW)**	n_2 **cm²/GW**	**Ref.**
VS_2	hydrothermal	nanosecond laser pulses at 532 nm wavelength	0 29 17 27		[1] SA
VS_2 BP VS_2/BP Nano hybrid	hydrothermal	120 fs, 800 nm excitation.	-(2.0±0.4) ×10-3 -(8.0±0.6) ×10-3 (165±20)×10-3	$(4\pm0.5)\times10^{-6}$ $(6.0\pm0.7)\times10^{-6}$ $(120\pm10)\times10^{-6}$	[2] ESA
VS_2 Rgo VS_2/rGO	Hydrotherma l	532 nm 5 ns pulses	-(4±1) (12 ± 2) (122 ± 4)	$(3\pm0.2)\times10^{-5}$ $(4\pm0.3)\times10^{-5}$ $(48.0\pm2)\times10^{-5}$	[3] Weak TPA ESA
VS_2/Ti_3C_2 MXene	hydrothermal excited state absorption (ESA)	800 nm 120 fs pulses	$(8.0\pm0.2)\times10^{2}$	$(4.2\pm0.2)\times10^{-6}$	[4] ESA

VS_2–NiS_2	Hydrothermal (TPA)	532-CW laser Nd:YAG laser	(0.141–2.025) *10^-3(cm/w)	24.23–35.62	[5] TPA
MoS_2	SA-TPA CVD	532	(31.18-145.72) cm/W	(3.11-5.16) $\times 10^{-4}$ (cm^2/W)	[6] SA TPA
VS_2 **VMS-1** **VMS-2** **VMS-3**	Hydrothermal SA-2PA(RSA)	532 DPSS CW laser (100 mW)	cm/W -(24.15 ± 0.25) 0.183±127E-4 0.115±3.96E-4 0.139±3.084E-5	$\times 10^4$ 1.168±0.023 0.023±0.013 0.181±0.072 1.758±0.295	[7] SA RSA
VSCo-1% **VSCo-2%** **VSCo-4%**	Hydrothermal 2PA(RSA) Self - defocusing	532 DPSS CW laser (100 mW)	Cm/W $\times 10^{-2}$ 2.163 ± 0.009 1.911 ± 0.081 0.851 ± 0.002	-(cm^2/GW) $\times 10^2$ 0.673±0.041 1.053±0.018 1.50299± 0.024	[8] RSA/2PA
VSNi-1% **VSNi-2%** **VSNi-4%**	Hydrothermal (RSA, Self-defocusing)	532 DPSS CW laser (100 mW)	2.118 ± 0.107 1.9174 ± 0.078 1.8073 ± 0.079	7.154±0.651 7.173±0.786 4.788± 0.383	**This work** RSA

Reference

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Table S2 (Band gap comparison from the literature)

Morphology /method	**Reported band gap**	**Reference**
Thin films of VS_4 for energy conversion.	Direct optical gap (1.35 ± 0.05 eV)	[1]
VS_4 nanorods/heterostructure for microwave absorption	1.0 eV	[2]
VS_4 nanoplates in composite(Ag_2WO_4/VS_4)photocatalysis	DFT 1.2 eV	[3]
VS_4/graphitic-C_3N_4 nanocomposite produced byhydrothermal	2.74 eV for composite	[4]

Reference:

[1] E. Flores, R. Díaz, N. Espinoza, ACS Appl. Energy Mater. 1 (2018) 5–13

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