



Supporting Information

for

Morphology and properties of pyrite nanoparticles obtained by pulsed laser ablation in liquid and thin films for photodetection

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Additional tables and figures

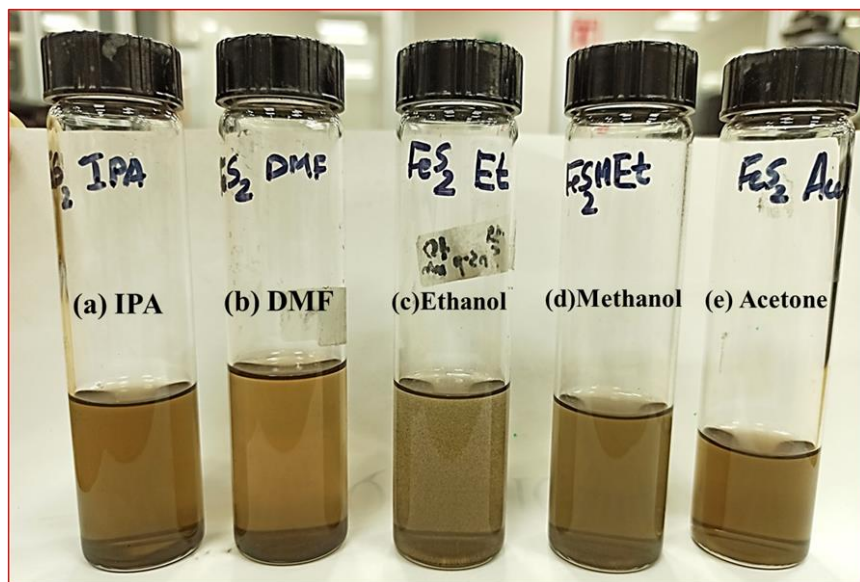


Figure S1: Images of FeS₂ nanocolloids prepared in different solvents (FIPA, FDMF, FET, FMET, and FAC respectively).

Table S1: Physical properties of the solvents used for the synthesis of pyrite NPs [1-5].

Solvents	Boiling point (°C)	Dipole moment (D)	Dielectric constant	Density (kg/m ³)	Viscosity (mPa s)	Vapor Pressure (Torr)
Isopropyl alcohol (IPA)	82.5	1.66	17.9	781	2.5	15
Dimethyl formamide (DMF)	153	3.86	36.71	944	0.796	2.7
Ethanol	78.3	1.69	24.5	789	1.074	43.9
Methanol	64.7	1.70	32.7	792	0.543	97
Acetone	56	2.88	20.7	784	0.306	184.5

Table S2: Binding energy values of the elements (Fe 2p, S 2p) identified in FeS₂ NPs synthesized in different solvents.

Samples	Binding energy (eV)						
	Fe ²⁺ in FeS ₂		Fe(II)–S in FeS	S ²⁻ in FeS		S ₂ ²⁻ in FeS ₂	
	Fe 2p _{3/2}	Fe 2p _{1/2}		S 2p _{3/2a}	S 2p _{1/2a}	S 2p _{3/2b}	S 2p _{1/2b}
FIPA	709.68	722.78	713.35	161.15	162.33	161.42	163.6
FDMF	709.17	722.27	713.96	161.84	163.02	162.96	164.14
FET	709.47	722.57	714.11	161.22	162.4	162.45	163.36
FMET	709.88	722.98	712.49	161.66	162.84	162.42	163.6
FAC	709.55	722.65	713.85	161.28	162.46	162.02	163.2

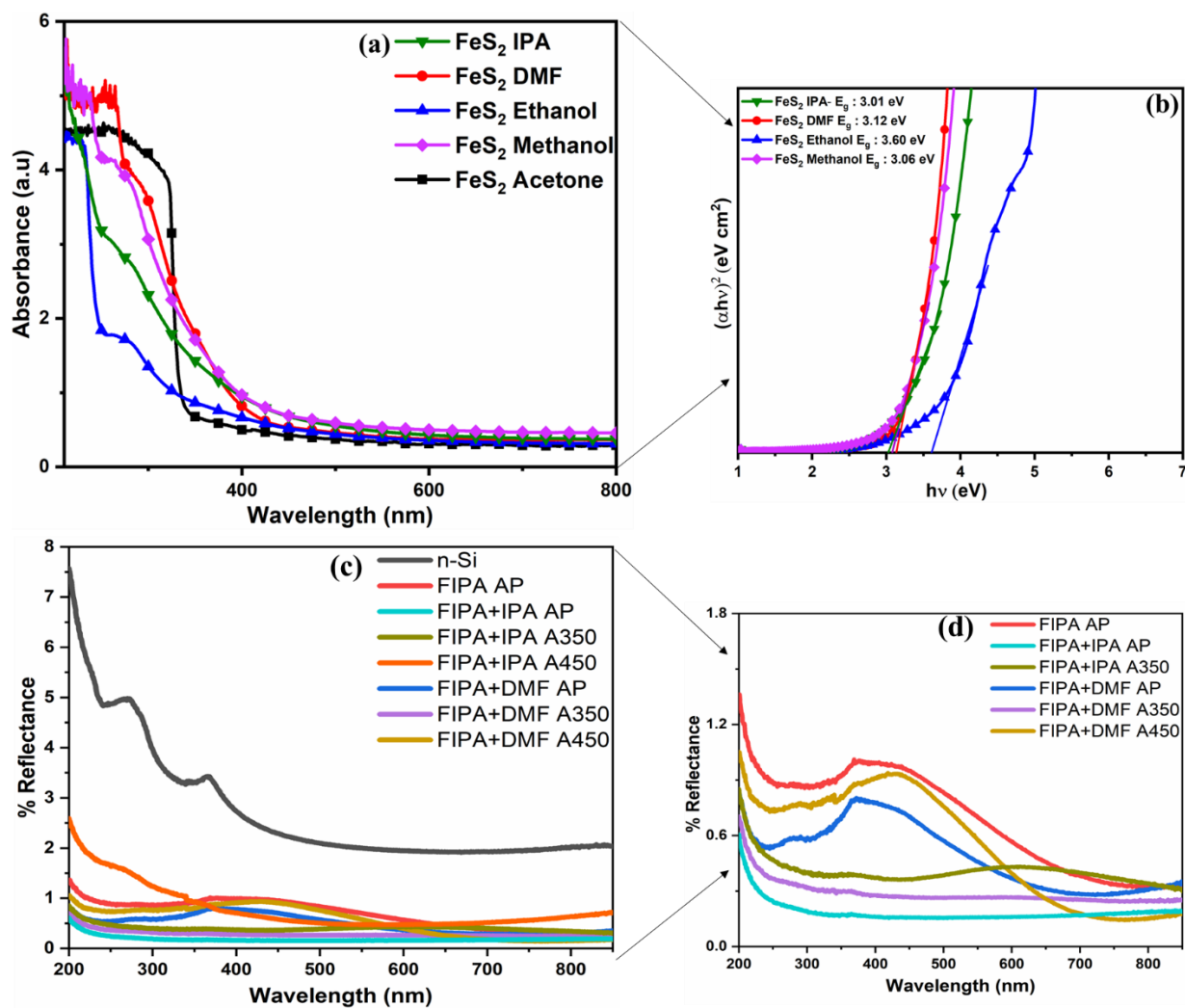


Figure S2: (a) The absorption spectra of FeS₂ nanoparticles synthesized by PLAL in different solvents (b, c). % Reflectance of as-prepared and annealed films, (d) zoomed image of the % reflectance of the films.

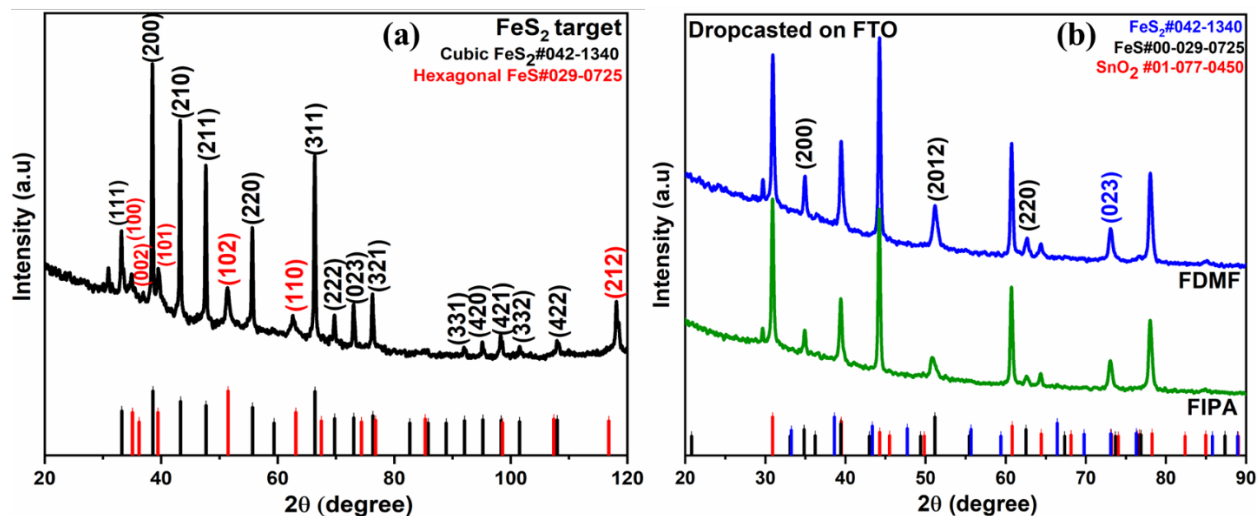


Figure S3: XRD patterns of the (a) pyrite target used for PLAL – diffraction peaks for FeS₂ and FeS are noted. (b) Films of FIPA and FDMF drop casted on FTO substrates.

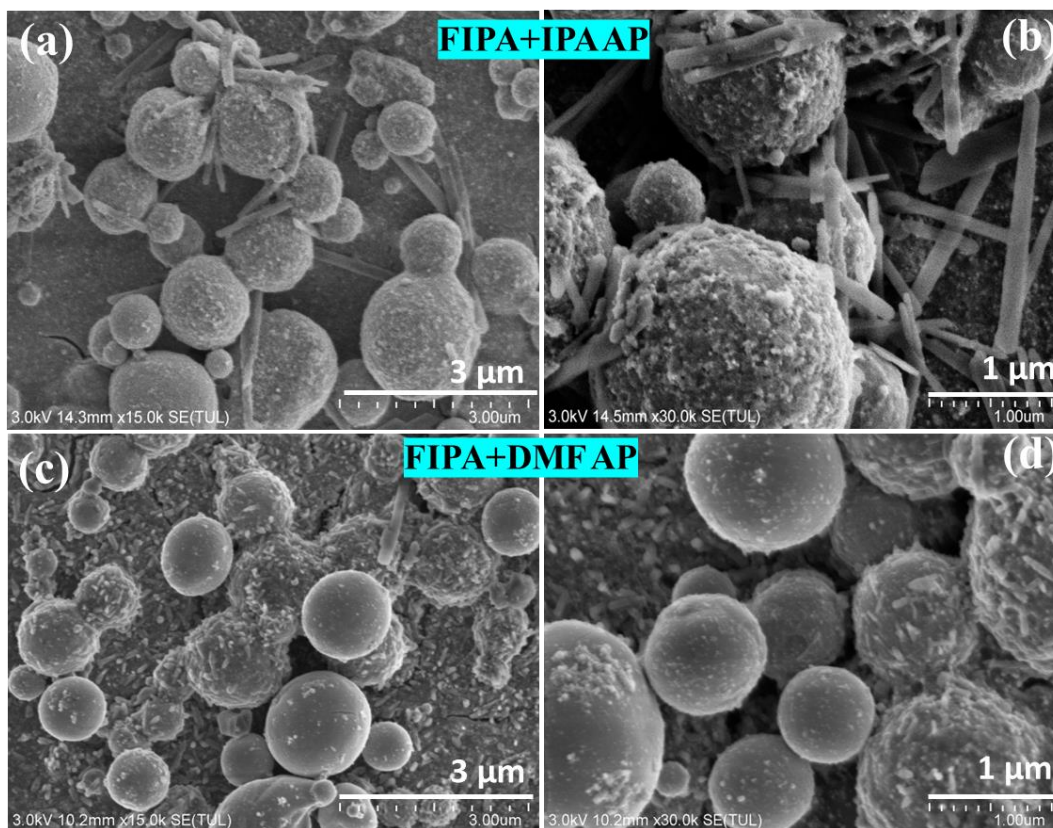


Figure S4: SEM images of as-prepared thin films fabricated on n-Si by EPD above which (a, b) FeS₂ NPs in IPA (FIPA) and (c, d) FeS₂ NPs DMF (FDMF) are spin coated.

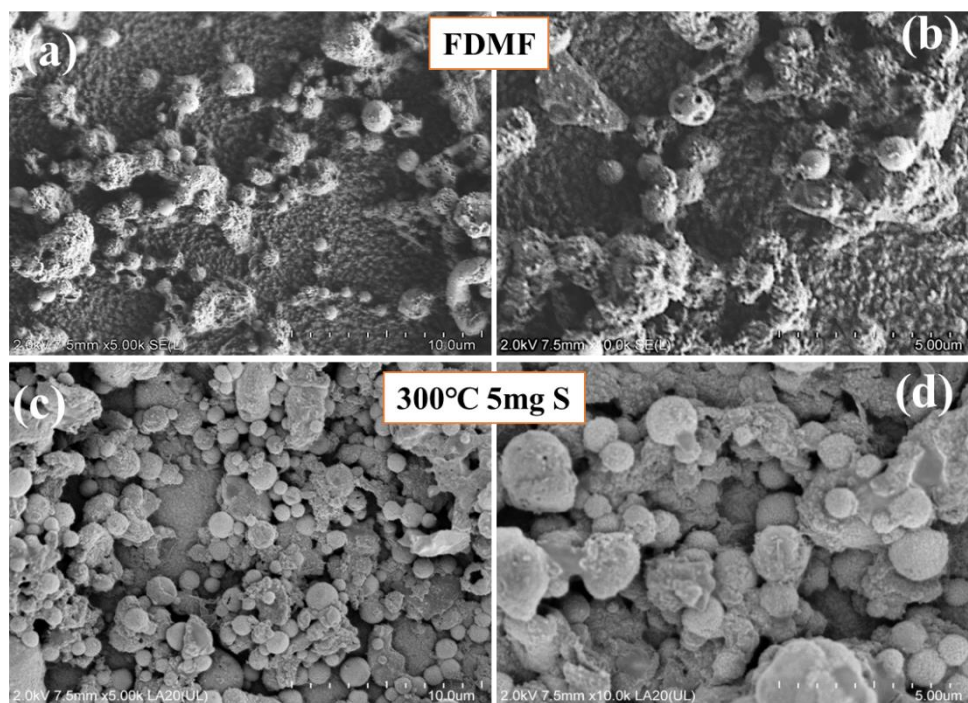


Figure S5: SEM images of as-prepared FDMF films on FTO (a, b) before and (c, d) after sulfurization. (Image scales are 10 and 5 μm).

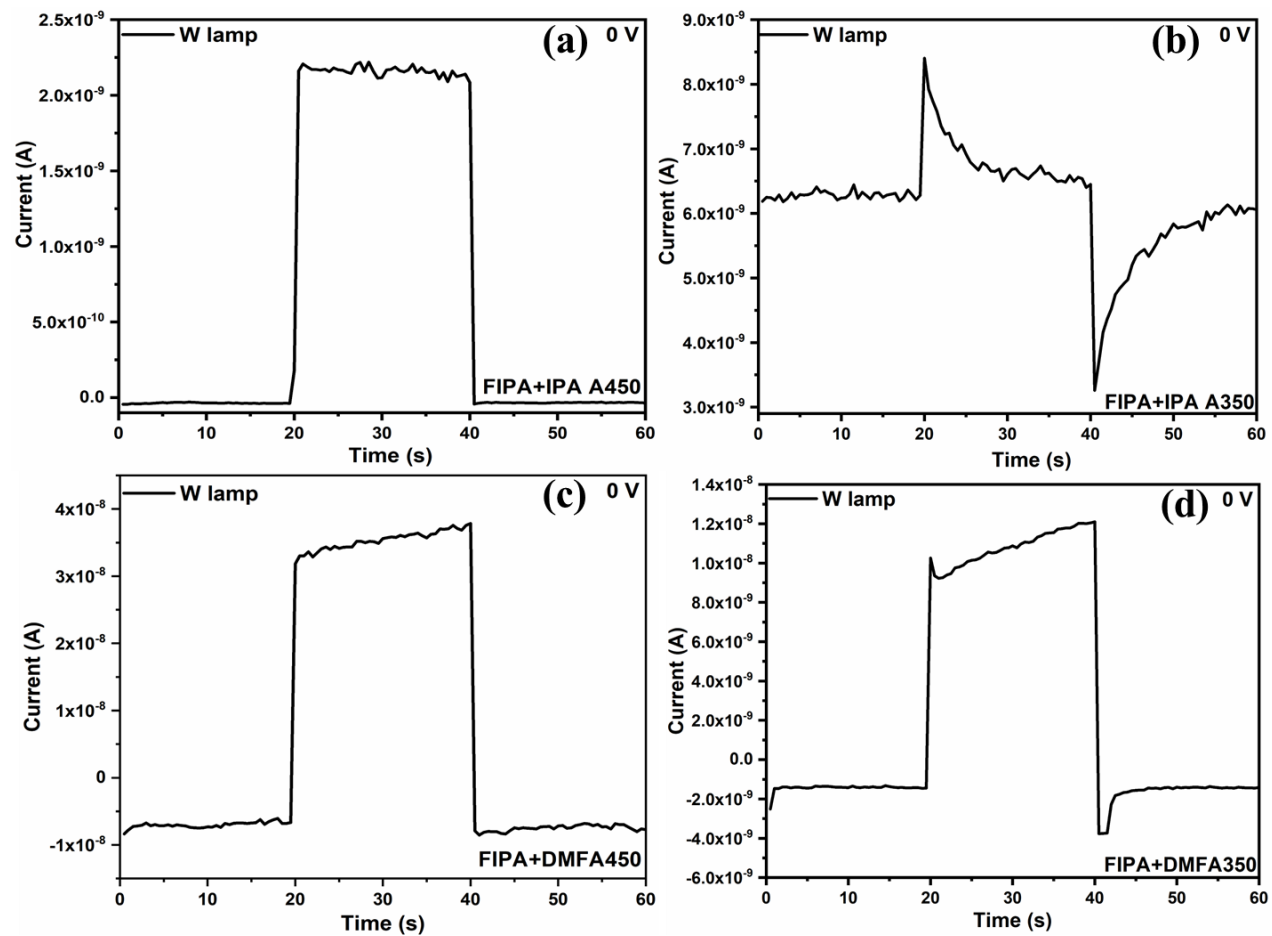


Figure S6: Photoresponse measurements of p-FeS₂/n-Si photodiode under illumination using W lamp under self-powered mode.

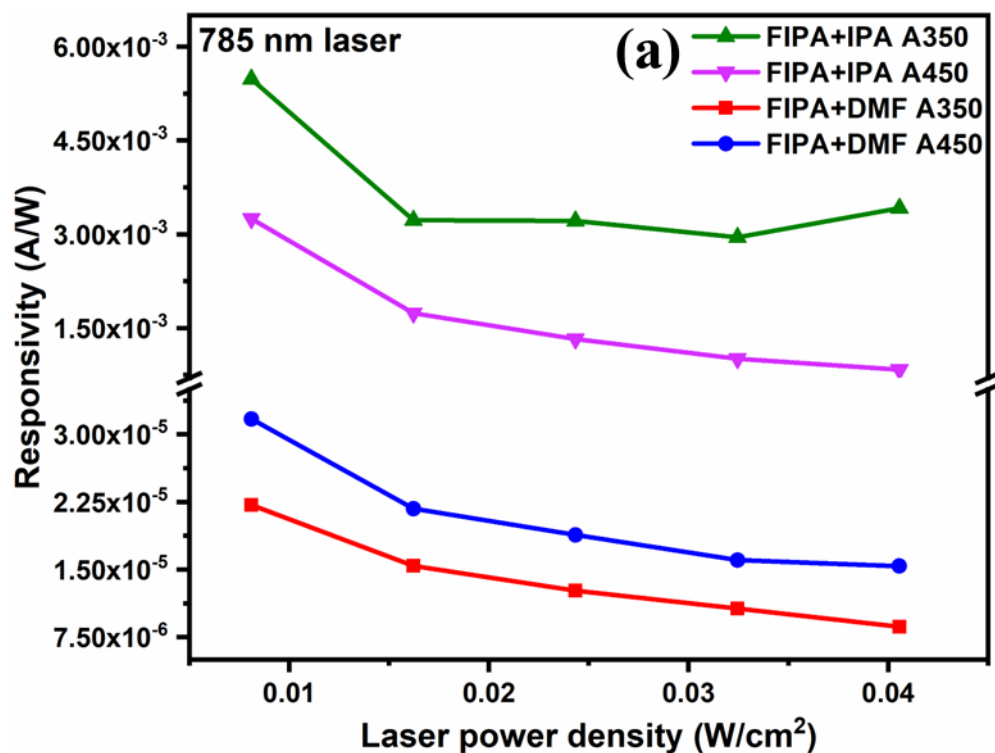


Figure S7: Responsivity of p-FeS₂/n-Si photodiode under illumination using 785 nm laser.

References

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