

Supporting Information

Iridium-Based Nanohybrids: Synthesis, Characterization, Optical Limiting, and Nonlinear Optical Properties

Nikolaos Chazapis ^{1,2}, Michalis Stavrou ^{1,2}, Georgia Papaparaskeva ³, Alexander Bunge ⁴, Rodica Turcu ⁴, Theodora Krasia-Christoforou ^{3,*} and Stelios Couris ^{1,2,*}

¹ Department of Physics, University of Patras, 26504 Patras, Greece; n.chazapis@iceht.forth.gr (N.C.); m.stavrou@iceht.forth.gr (M.S.)

² Institute of Chemical Engineering Sciences (ICE-HT), Foundation for Research and Technology-Hellas (FORTH), 26504 Patras, Greece

³ Department of Mechanical and Manufacturing Engineering, University of Cyprus, 1 Panepistimiou Avenue, 2109, Aglantzia, Nicosia, Cyprus; papaparaskeva.georgia@ucy.ac.cy

⁴ National Institute R&D of Isotopic and Molecular Technologies, 400293 Cluj-Napoca, Romania; alexander.bunge@itim-cj.ro (A.B.); rodica.turcu@itim-cj.ro (R.T.)

* Correspondence: krasia.theodora@ucy.ac.cy (T.K.-C.); couris@upatras.gr (S.C.)

Tauc plots

The optical band gap energy, E_g , of the PVP-IrO₂ system was estimated by extrapolating the linear part of curve $(\alpha_0 h\nu)^2$ with the incident energy ($h\nu$) to the x-axis at $(\alpha_0 h\nu)^2 = 0$, according to Tauc equation [S1]:

$$\alpha_0 h\nu = C(h\nu - E_g)^n$$

where h is the Planck's constant, ν is the photon's frequency, C is a constant and $n=1/2$ for direct allowed transitions.

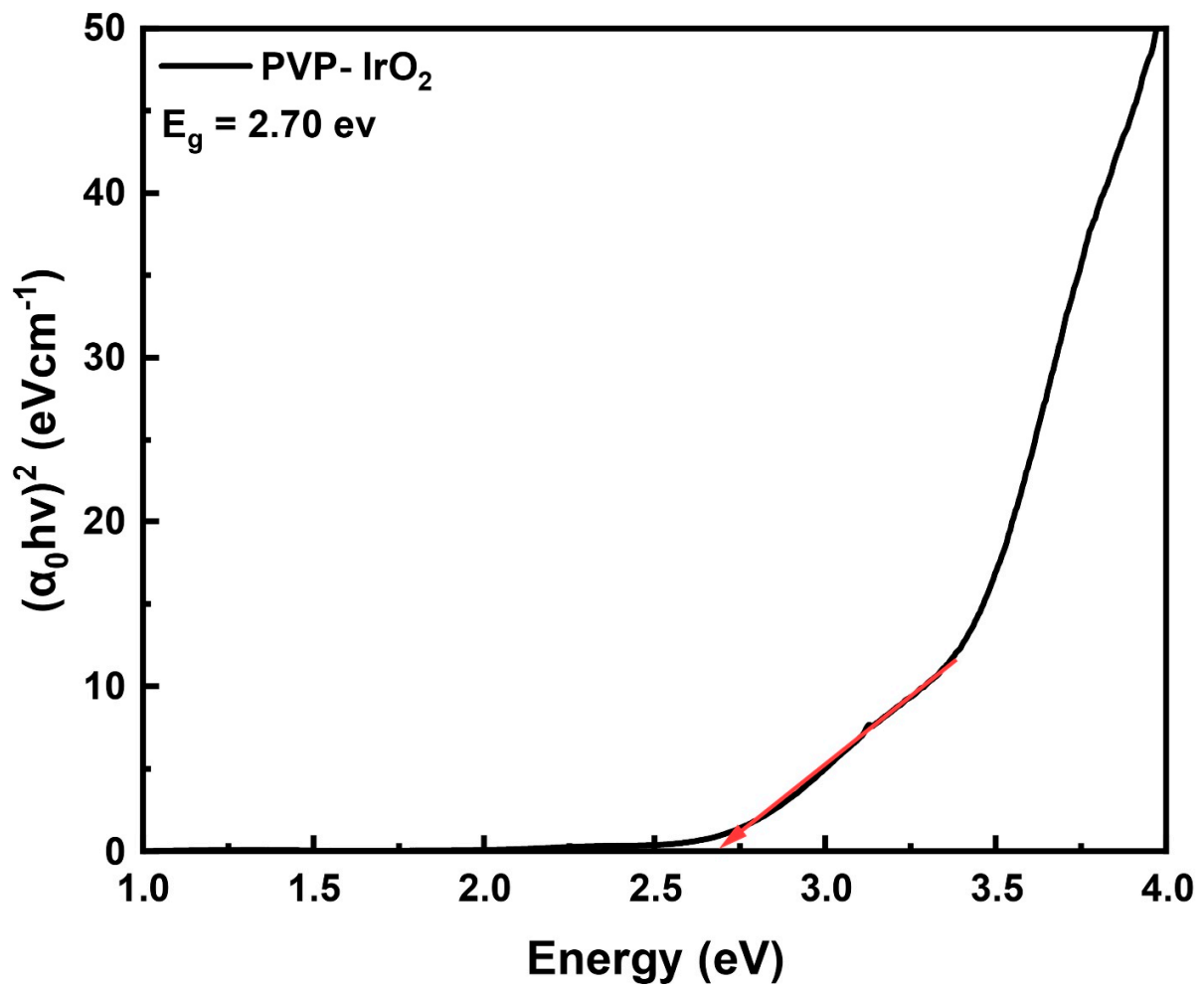


Figure S1. Tauc plots of PVP-IrO₂ for direct optical transitions.

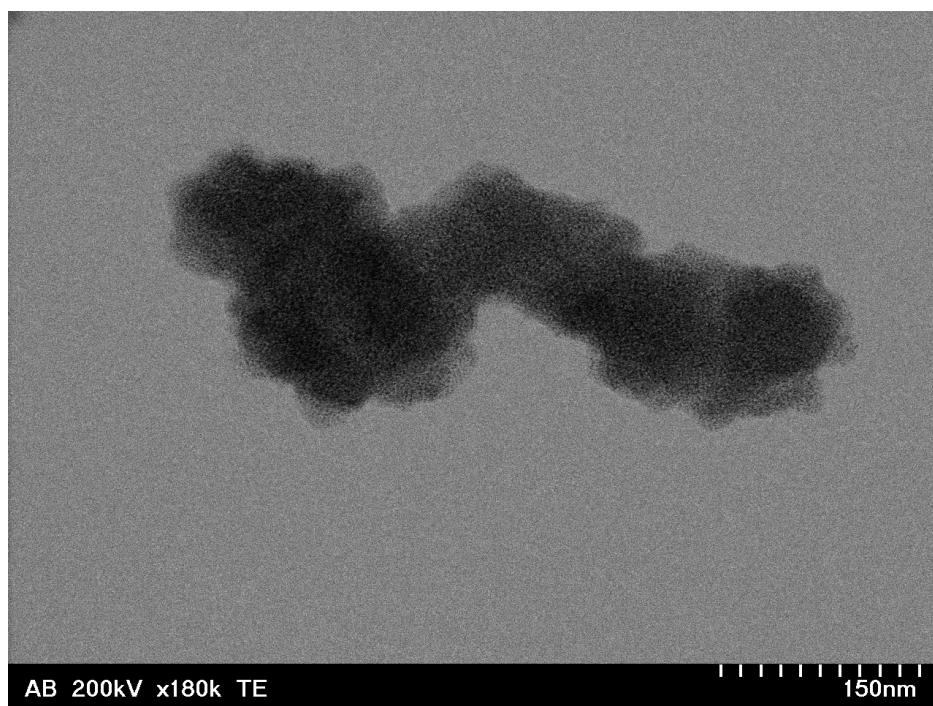


Figure S2. TEM image of sample I (Ir/IrO₂).

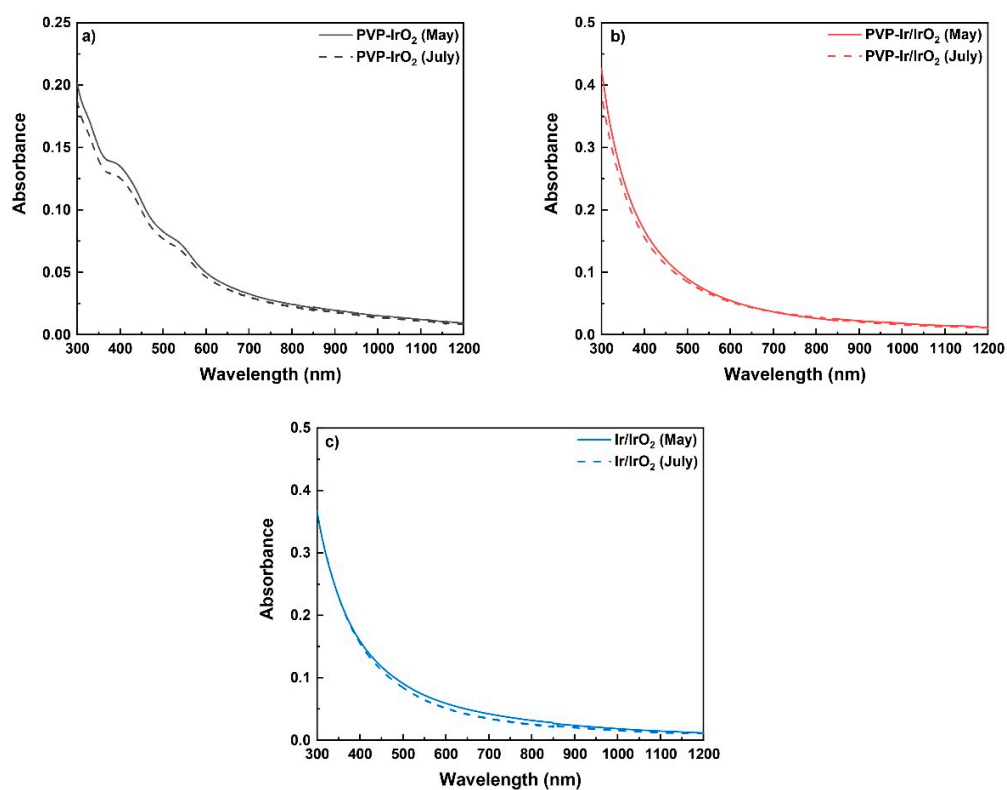


Figure S3: UV-Vis-NIR absorption spectra of (a) PVP-IrO₂, (b) PVP-Ir/IrO₂ and (c) Ir/IrO₂ nanohybrid solutions in different periods.

Table S1. NLO refraction of PVP-IrO₂, PVP-Ir/IrO₂, Ir/IrO₂, Au, ZnO, γ -Fe₂O₃, poly(sodium-4-styrenesulfonate) (PSS)-Cu(OH)₂, PSS-Cu(OH)₂/CuO and PVP/Pd nanoparticles.

Sample	Excitation conditions	α_0 (cm ⁻¹)	γ' ($\times 10^{-21}$ m ² /W)	$\text{Re}\chi^{(3)}$ ($\times 10^{-16}$ esu)	$\text{Re}\chi^{(3)}/\alpha_0$ ($\times 10^{-16}$) esu cm	Ref.
PVP-IrO ₂	4 ns, 532 nm	1.77	-89.8	-100.5	59.1	this work
PVP-Ir/IrO ₂	4 ns, 532 nm	1.8	-20.0	-22.4	12.4	
Ir/IrO ₂	4 ns, 532 nm	1.79	-19.9	-22.3	12.4	
PVP-IrO ₂	4 ns, 1064 nm	0.39	-28 ± 4	31.9 ± 5.0	82.9 ± 12.0	
PVP-Ir/IrO ₂	4 ns, 1064 nm	0.38	-7.8 ± 0.4	8.7 ± 0.4	22.6 ± 1.0	
Ir/IrO ₂	4 ns, 1064 nm	0.43	-13.3 ± 2.0	14.7 ± 2.0	34.0 ± 4.0	
PVP/Pd	4 ns, 532 nm	7.5	-238	-330.5	44.1	S2
	4 ns, 1064 nm	6.8	-109	-151.4	22.3	
PSS-Cu(OH) ₂	4 ns, 532 nm	1	-121	-136	136	S3
PSS-Cu(OH) ₂ /CuO	4 ns, 532 nm	6.8	-436	-489	-489	
γ -Fe ₂ O ₃	4 ns, 532 nm	~5.1	N/A	-9.1	1.8	S4
	4 ns, 1064 nm	~1.15	N/A	3.7	3.2	
Au	4 ns, 532 nm	~0.9	-30.1	-33.7	37.4	S5
ZnO	10 ns, 532 nm	~N/A	120	530	N/A	S6

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