Supplementary Information

Sonochemical-assisted synthesis of $CsPbBr_3$ perovskite quantum dots using vegetable oils

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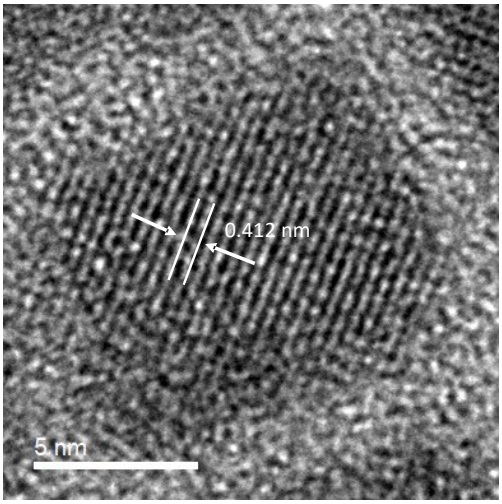

Figure S1- HRTEM image of a single-particle of $CsPbBr_3$ synthesized in peanut oil as green solvent. The image indicates a crystalline interplanar spacing of 0.412 nm relative to the (121) crystalline plane of the orthorhombic phase.

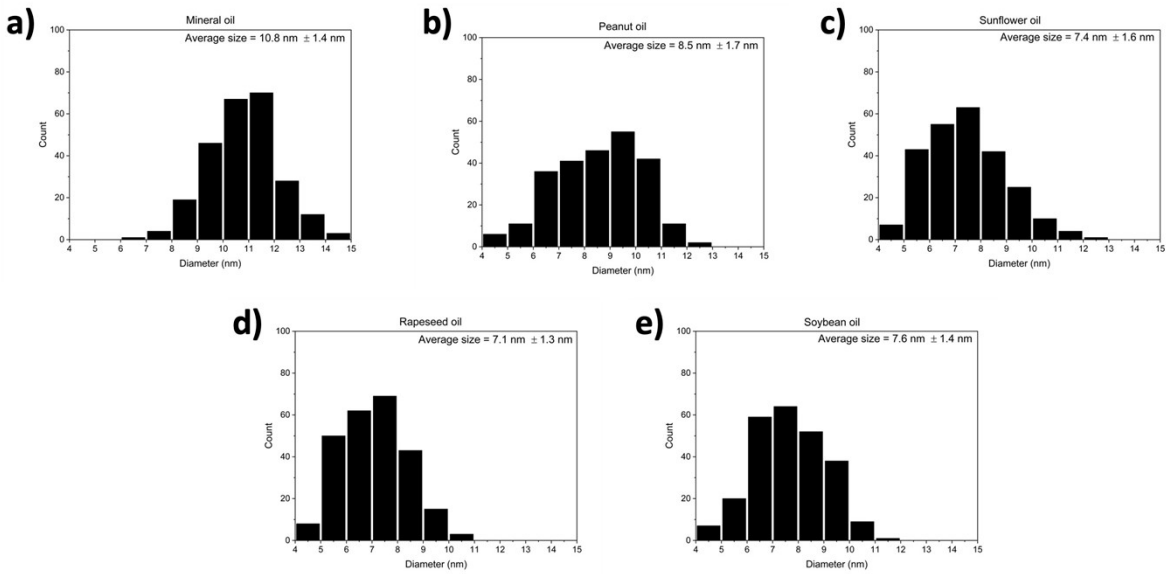

Figure S2- Particle size histograms of $CsPbBr_3$ PQDs obtained in different solvents: a) mineral oil, b) peanut oil, c) sunflower oil, d) rapeseed oil and e) soybean oil.

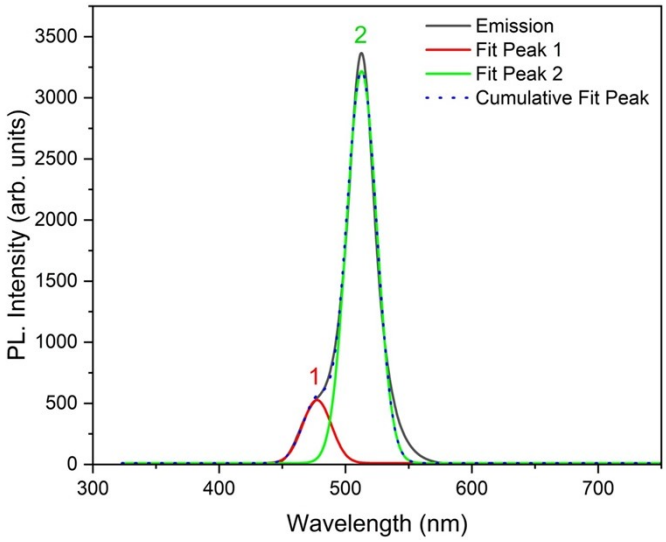

Figure S3 - Deconvolution of $CsPbBr_3$ (synthesized in peanut oil) into two peaks.

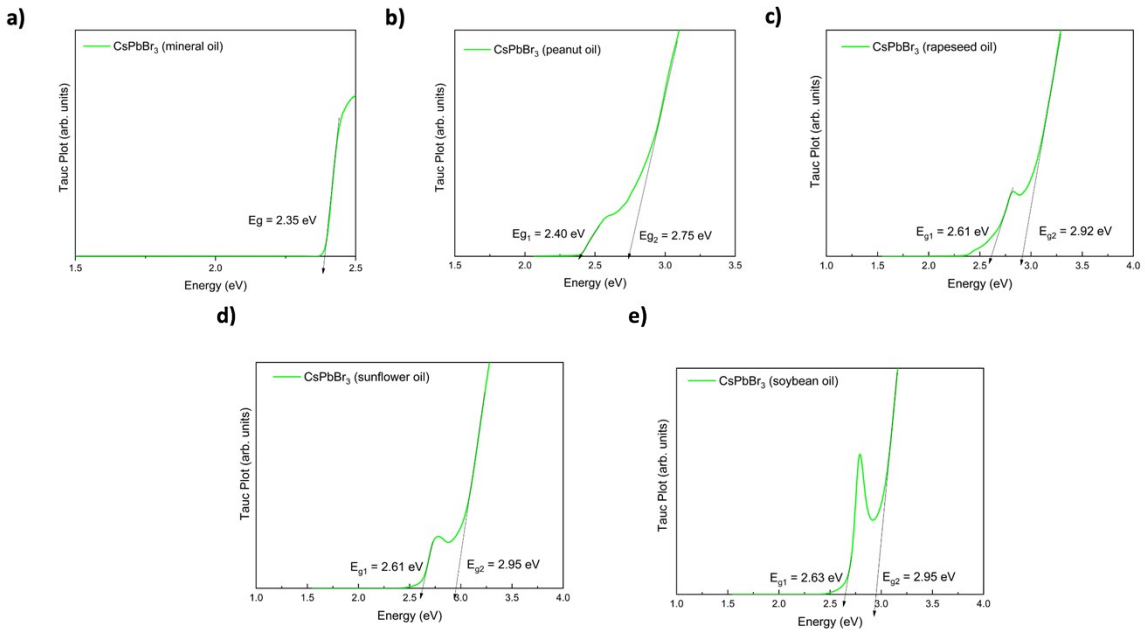

Figure S4 - Tauc-plots of $CsPbBr_3$ synthesized in different solvents: a) mineral, b) peanut oi, c)rapeseed oil, d) sunflower oil and e) soybean oil.

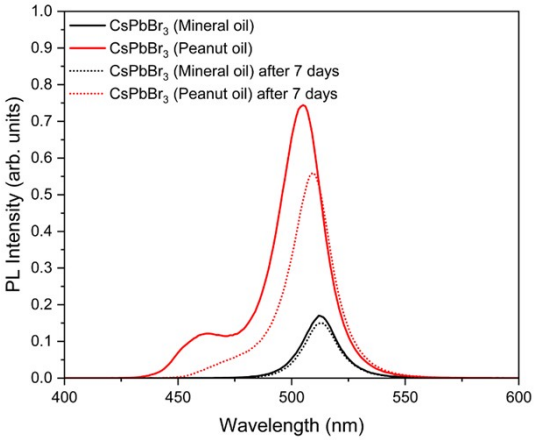

Figure S5 - PL spectra of CsPbBr3 PQDs synthesised in mineral and peanut oil: A comparison before and after seven days.

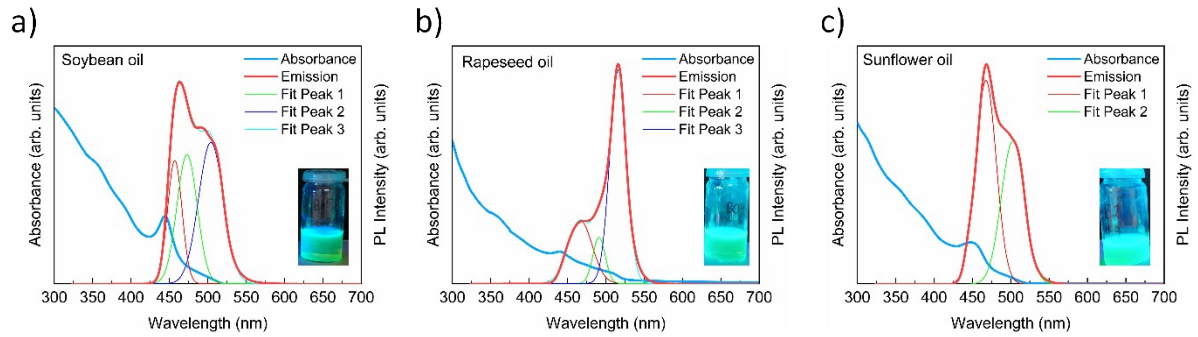

Figure S6 - Absorbance and photoluminescence spectra of $CsPbBr_3$ quantum dots synthesised in a) soybean, b) rapeseed and c) sunflower oils. An additional band between 450-470 nm can be observed in all the PL spectra, suggesting the formation of particles with different size distributions.

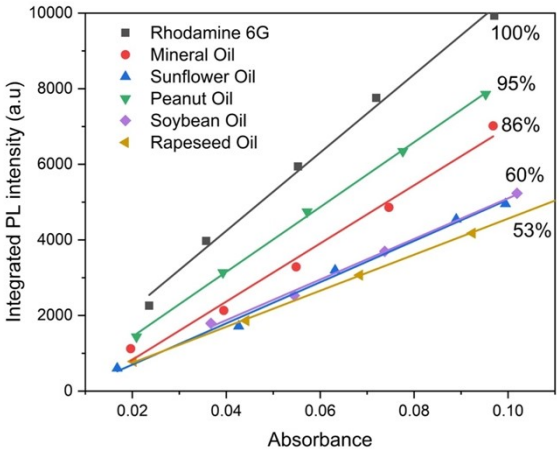

Figure S7 - Photoluminescence Quantum Yield (PLQY) of the PQDs synthesized using the different oils. The values obtained are compatible with those of the reference mineral oil (86 %). The highest PLQY of 95 % was obtained by using peanut oil.

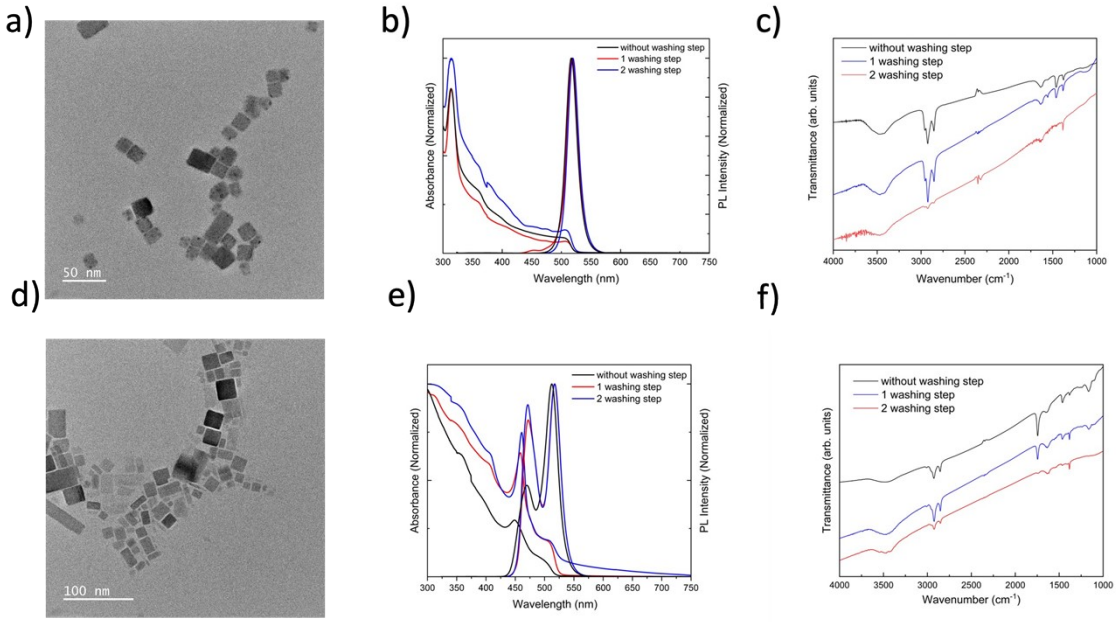

Figure S8 - TEM images of $CsPbBr_3$ synthesized in a) mineral oil and d) peanut oil after purification. Absorbance and PL spectra before and after 1 and 2 washing steps show no difference in the spectra when b) mineral oil, but the appearance of an additional band is observed when e) peanut oil is used. FTIR spectra show the reduction in the amount of ligands after each washing step for both c) mineral and f) peanut oil.

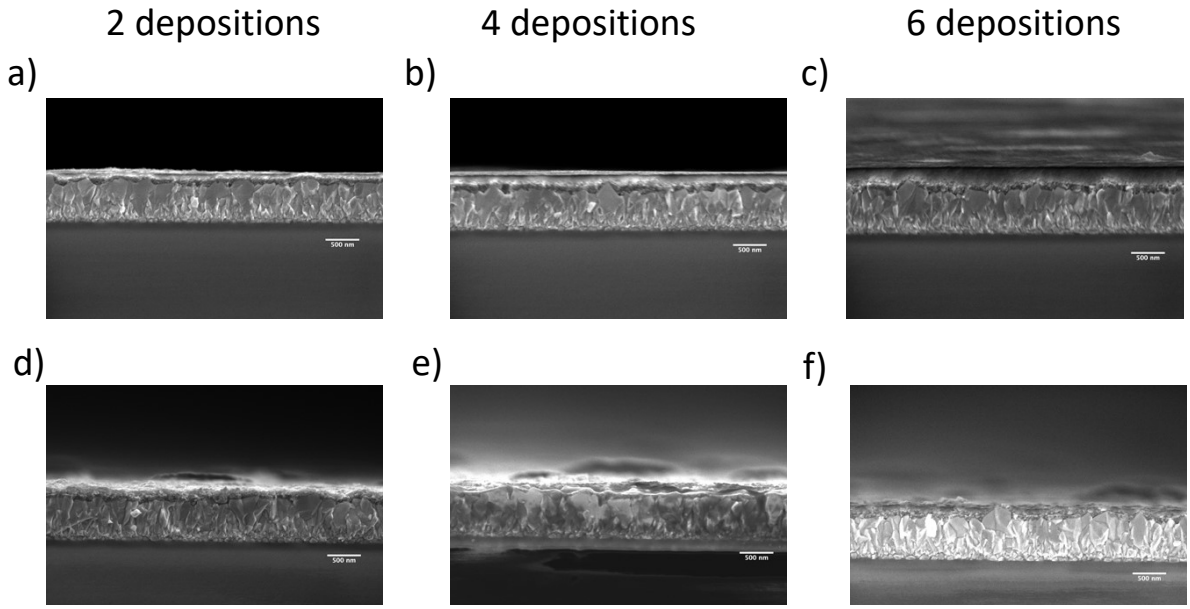

Figure S9 - SEM cross-section images of $CsPbBr_3$ films deposited by spin coating in c-TiO_2/FTO substrates. a), b) and c) correspond to $CsPbBr_3$ films from mineral oil solution of 2, 4 and 6 layers thickness, respectively. d), e) and f) are the films deposited from the peanut oil solution.

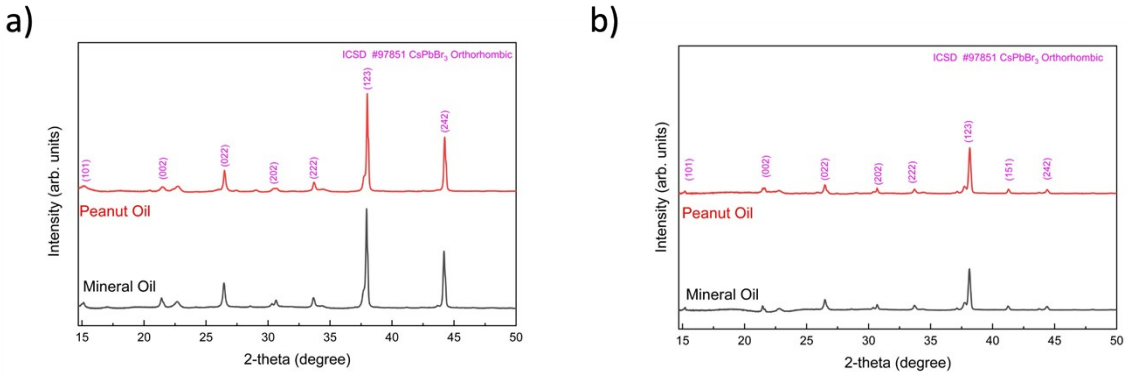

Figure S10 - XRD patterns of $CsPbBr_3$ QD films (with 6 layers), prepared in mineral oil and peanut oil: a) fresh sample, b) after eight months.

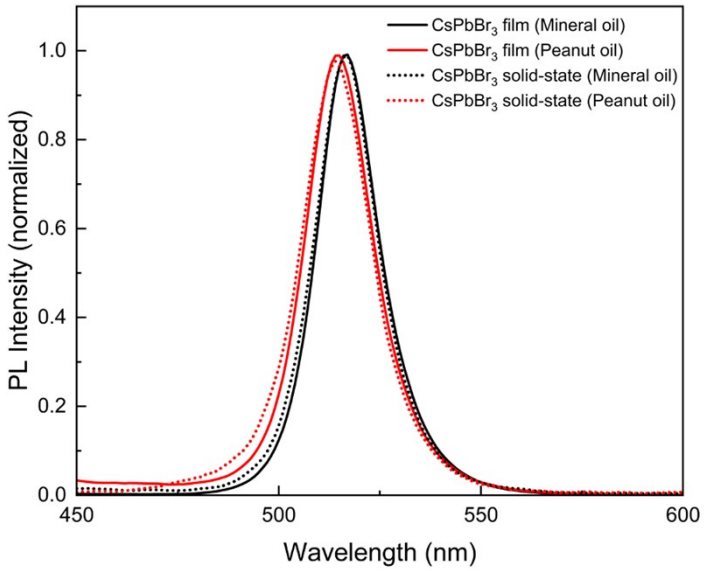

Figure S11 - Normalized photoluminescence (PL) spectra of $CsPbBr_3$ PQDs films synthesised in mineral and peanut oil.

Table S1 - Vegetable oils used as solvents in the syntheses of CsPbBr3. Vegetable oils are complex mixtures containing triglycerides, whose fatty acid fractions can be determined experimentally. For each vegetable oil it is indicated below the fatty acid content as described in reference 38. The first digit after the compound name indicates the chain length (number of carbon atoms) and the second digit indicates the number of double bonds in the hydrocarbon chain.

Vegetable oil	Compound	Quantity (%)	REF
Sunflower	Palmitic Acid 16:0	6	[38]
	Oleic Acid 18:1	21	
	Linoleic Acid 18:2	68	
Peanut	Palmitic Acid 16:0	10	[38]
	Oleic Acid 18:1	50	
	Linoleic Acid 18:2	32	
Rapeseed	Palmitic Acid 16:0	4	[38]
	Oleic Acid 18:1	62	
	Linoleic Acid 18:2	21	
Soybean	Palmitic Acid 16:0	12	[38]
	Oleic Acid 18:1	24	
	Linoleic Acid 18:2	53	