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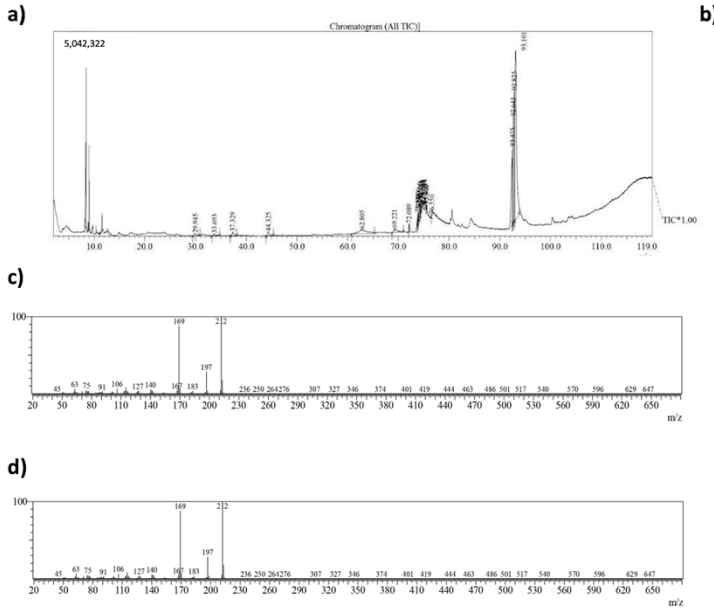
Sustainable Next-generation Color Converters of *P. harmala* Seed Extracts for Solid-State Lighting

Talha Erdem[a,*], Ali Orenc[b], Dilber Akcan[c], Fatih Duman[b,d], Zeliha Soran-Erdem[c,e,*]

[a.]Department of Electrical-Electronics Engineering, Abdullah Gül University, Kayseri, Türkiye
[b.]Nanotechnology Research Center (ERNAM), Erciyes University, Kayseri, Türkiye
[c.]Bioengineering Program, Graduate School of Engineering and Science, Abdullah Gül University, Kayseri, Türkiye
[d.]Department of Biology, Erciyes University, Kayseri, Türkiye
[e.]Department of Engineering Sciences, Abdullah Gül University, Kayseri, Türkiye
[†]Zeliha Soran Erdem (zeliha.soranerdem@agu.edu.tr) and Talha Erdem (erdem.talha@agu.edu.tr) are co-corresponding authors.



b)

No.	RT (min)	Name of the Compound	Molecular Formula	Molecular Weight	Peak Area (%)
1	29.945	Undecanoic Acid	$C_{11}H_{22}O_2$	186.3	1.18
2	33.693	2-Propenal, 3-phenyl-	C_9H_8O	132.15	0.71
3	37.329	Methyl 8-oxooctanoate	$C_9H_{16}O_3$	172.22	0.99
4	44.325	Nonanoicacid, 9-oxo-, methylester	$C_{10}H_{18}O_3$	186.25	1.17
5	62.805	Ethyl alpha- d- glucopyranoside	$C_8H_{16}O_6$	208.21	6.16
6	69.221	3-phenyl-1H -pyrazole-4-carbaldehyde	$C_8H_8N_2$	144.14	2.17
7	72.089	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270,45	0.59
8	73.839	3-diamantylphosphonic acid dichloride	$CH_2[P(O)Cl_2]_2$	249.78	0.81
9	73.900	2-ethylidene-1-methyl-3-phenylimidazolidine	$C_{12}H_{16}N_2$	188.272	0.65
10	73.960	Vasicine	$C_{11}H_{12}N_2O$	188.23	0.43
11	74.225	1,2 Bis(diethylamino-1,2-bis(4-cyanophenyl) ethane	$C_{18}H_{20}N_4$	298.4	0.55
12	74.365	2-ethylidene -1-methyl-3-phenylimidazolidine	$C_{12}H_{22}N_2$	194.32	1.14
13	74.511	Beta-nitrobenzo(2,3) tricyclo (2.2.1.O(6,7)) heptene	$C_{11}H_9NO_2$	187.2	1.00
14	74.640	3-diamantylphosphonic acid dichloride	CH_3Cl_2OP	131.91	0.13
15	75.044	2-(2-fluorophenyl) aniline	$C_{12}H_{10}FN$	187.21	0.11
16	75.111	7- hydroxy-deoxypeganine	$C_{11}H_{12}N2O$	188.23	0.26
17	75.440	Beta-nitrobenzo(2,3) tricyclo (2.2.1.O(6,7)) heptene	$C_{11}H_9NO_2$	187.2	0.09
18	75.508	3-methyl-1-dimethylphenylsilybuta-1,3-diene	$C_{13}H_{16}$	172.27	0.05
19	76.550	2-ethyllidene-1-methyl	$C_{12}H_{20}$	164.29	0.04
20	92.475	1-ethyl-5-methyl-5-isopropylaminobabituric acid	$C_9H_{14}N_2O_2S$	214.29	4.05
21	92.645	Beta-carboline,8-methoxy-1-methyl-	$C_{13}H_{12}N_2O$	212.247	11.46
22	92.825	2,3-Dihydro-1H-2-isopropylcyclopenta [b] quinoxaline	$C_{11}H_{10}N_2$	170.21	17.67
23	93.101	Harmine	$C_{13}H_{12}N_2O$	212.25	48.59

Figure S1. a) GC-MS chromatogram of aqueous extract of whole plant extract of *P. harmala*, b) Phytochemicals identified in *P. Harmala* seed extract, c,d) Mass spectra of harmine and beta-carboline 8-methoxy -1-methyl identified by GC-MS, respectively.

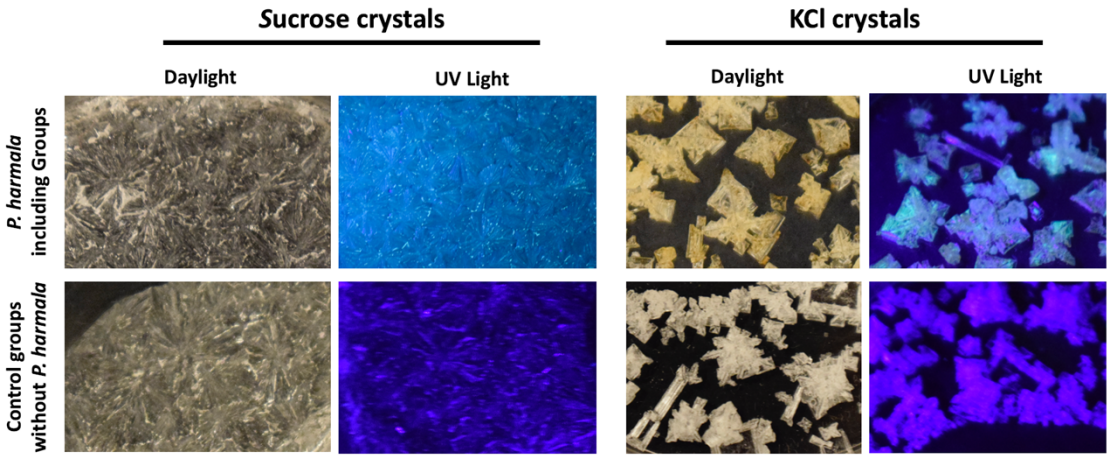


Figure S2. Images of sucrose and KCl crystals with and without *P. harmala* extract.

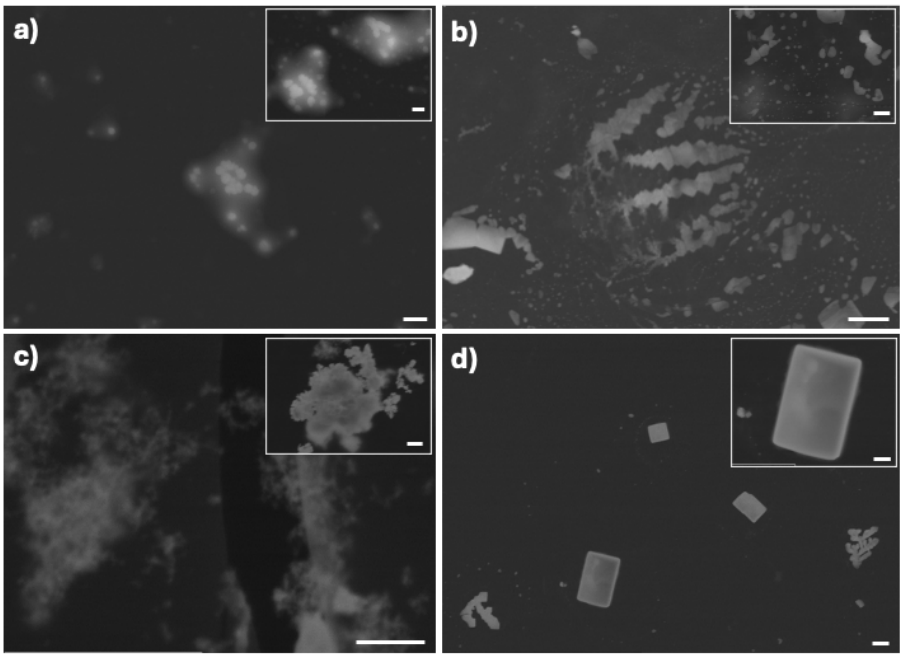


Figure S3. STEM images of a) sucrose crystal powders including Peganum harmala , b) KCl crystal powders including Peganum harmala, c) sucrose crystal powders without Peganum harmala extract (sucrose control group) , d) KCl crystal powders without Peganum harmala extract (KCl control group). Insets represent the magnified images of the respective groups. The scale bars indicate 2 µm for the main images and 1 µm for the insets.

Table S1. The average sizes and standard deviations of the crystal powders calculated from STEM images using the Image J program.

Groups	Average Size	Standart Deviation
Peganum harmala in sucrose crystal powder	383 nm	142 nm
Peganum harmala in KCl crystal powder	345 nm	124 nm
Only sucrose crystal powder	324 nm	136 nm
Only KCl crystal powder	1.5 µm	1.8 µm

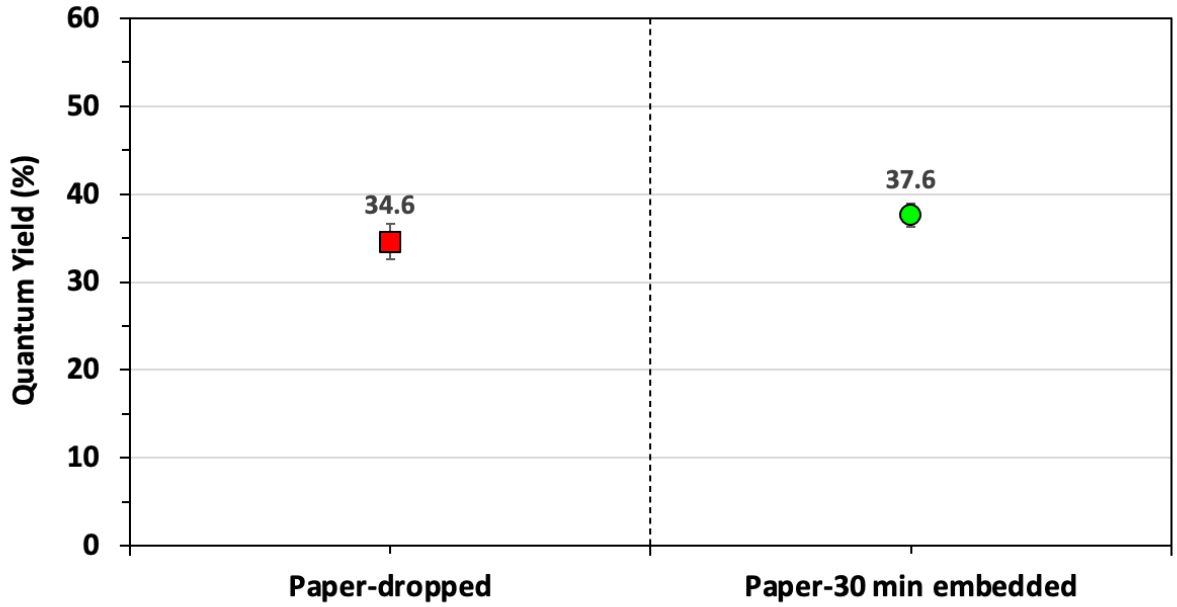


Figure S4. Quantum yields of *P. harmala* dropped papers and 30 min embedded papers.