

Supplementary Information

Enhanced electrical and luminescent performance of porous silicon/MEH-PPV nanohybrid synthesized by anodization and repeated spin coating

A. M. S. Salem,^a F. A. Harraz,^{a,†} S. M. El-Sheikh,^a H. S. Hafez,^b I. A. Ibrahim^a and M.
S. A. Abdel Mottaleb^c

^a Nanostructured Materials and Nanotechnology Division, Central Metallurgical Research and Development Institute (CMRDI), P.O. Box: 87 Helwan, Cairo 11421 Egypt.

^b Environmental Studies and Research Institute, Sadat University, Sadat City, Egypt.

^c Nano-Photochemistry and Solar Chemistry Labs., Department of Chemistry, Faculty of Science, Ain Shams University, Abbassia, Cairo, Egypt.

† E-mail: fharraz68@yahoo.com; Tel: +20-27142452; Fax: +20-27142451

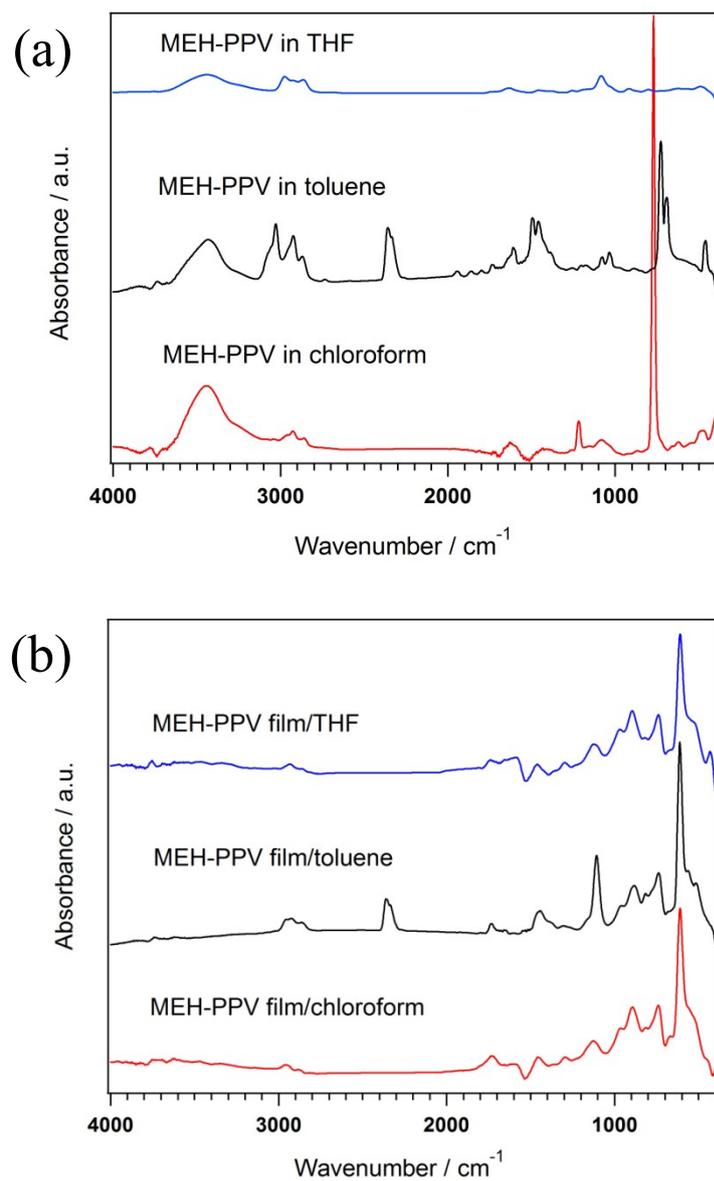


Fig. S1 FT-IR spectra recorded for; (a) MEH-PPV dissolved in different organic solvents and (b) spin coated MEH-PPV film using different solvents into the porous silicon.

Table S1 FTIR peak assignments for MEH-PPV dissolved in different solvents and for as-formed films prepared by spin coating into the porous silicon.

Toluene Peak position cm ⁻¹		THF Peak position cm ⁻¹		Chloroform Peak position cm ⁻¹		Peak assignments
Solution	Deposited film	Solution	Deposited film	Solution	Deposited film	
3740(w) 3650-3120 (3432)(br)		3700- 3100 (3440)(br)		3780(w) 3680- 3100 (3445)(br)		-O-H stretching of water dissociation and non- dissociation
3030(s)						-Aromatic =C-H stretch
	2950		2950(w)		2958(w)	-CH ₃ antisymmetric stretch
2924 2920(s)	2924			2926(w)		-C-H stretch of the alkyl
2865	2863(w)	2870(W)	2890(w)	2880(w)	2887(w)	-CH ₂ symmetric stretch
1940(w) 1880 (w) 1800(w) 1732(w)	1736(w,br)		1737(w,br)		1734(w,br)	-(2000-1665 cm ⁻¹) weak band known as "overtones)
1607		1637(W)		1629		-O-H bending vibration of water
1590 1494(br)	1593(w) 1450(W, br)		1590(w) 1459(br)		1596(w) 1457(br)	-C-C stretch (in-ring) -C-C stretch aromatic ring)
1457(br)				1432		- C-H umbrella bend
	1295(w,br)		1296(w,br)		1294(w,br)	-CH ₃ symmetric deformation
	1108(s,br)		1122(br)		1120(br)	-Si-O-Si stretching
1078 (w) 1033 (w)		1083(s)		1082		-C-H bending in plane
	894(w)		895(w)		893(w)	-SiOH bend
850-630 (820, 810) (s, W)	814	801(w)				C-H "oop" aromatic substitution
				771(s)		-C-Cl stretch
	740(br) 630-490(s, W)		739(br) 635-490 (s, W)		739(br) 626-490 (s, W)	-Out of plane ring bend of phenyl ring
464	464(w)	491(w)	462(W)	472(w)	461(w)	-C-H bend (medium) - Si-O-Si

*br (broad), s (strong and sharp), W (wide), w (weak), Bands in red color are related to the solvents (THF, toluene and chloroform), Bands in blue color are related to MEH-PPV films deposited into PSi and solvents, Bands in **black color** for Si wafer.*

Fig. S1 (a,b) represents the FT-IR spectra measured between 400~4000 cm^{-1} for the MEH-PPV dissolved in different solvents (THF, toluene and chloroform) and the spin coated MEH-PPV films into the P*Si* templates. The assignments of the absorption bands were done according to earlier work¹⁻⁴. The characteristic peaks for the polymeric solutions and for deposited films, along with the complete assignments of the bands are listed in **Table S1**. It can be observed from the data collected in **Table S1** and **Fig. S1(a)** that the bands position and type recorded from the solutions containing polymer displayed strong absorption bands at 1637-1607 as well as a broad band between 3100 and 3780 cm^{-1} . It can be deduced that the appearance of the latter bands is ascribed to the surface-(OH) stretching vibration of the coordinated water molecule groups originating from dissociation chemisorbed and non-dissociated water molecules. On other hand, it can be noticed that, the bands appeared at 2926-2920, 1457-1432, 850-630, 491-464 cm^{-1} revealed the characteristic shapes of -CH- in different solvents. Meanwhile, it can be deduced that the solvation power of toluene is higher than chloroform and THF. This can be attributed to the band intensities of MEH-PPV polymer are higher and clear in toluene more than chloroform and THF. Moreover, MEH-PPV polymer reveals broad and strong bands at 1590, 1494, 850-630 cm^{-1} in toluene compared with chloroform or THF solvents. Additionally, it is worth to note that the strong absorption bands at 1637-1607 as well as a broad band between 3100 and 3780 cm^{-1} characteristic to O-H stretching are disappeared in the deposited MEH-PPV films, which can be attributed to the evaporation of the solvents during drying of the samples. It can be also observed that the intensities of the absorption bands of the deposited MEH-PPV film produced from toluene are strong and sharp compared to other solvents. Moreover, the strong bands appearing at 1108-1122 cm^{-1} are assigned to Si-O-Si stretching mode appeared for the P*Si* deposited polymeric film in all solvents, whereas the small bands appearing at 464-461 cm^{-1} are assigned to the Si-O-Si asymmetric stretching mode.

References

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