Supporting Information

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Microwave-assisted preparation of graphene quantum dots immobilized nanosilica as an efficient heterogeneous nanocatalyst for the synthesis of xanthenes

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S.1. Spectral and analytical data of selected compounds

*14-Phenyl-14H-dibenzo [a, j] xanthene (**2a**)*: Yield 94%, mp. 188-190 ˚C. FTIR (KBr, cm^{-1}): 3072 (Ar-H stretch), 2922 (C-H stretch), 1618 (C=C stretch). ^{1}H NMR ($CDCl_3$, 300 MHz): δ= 8.11 (d, 2H, *J* = 8.2 Hz), 7.77 (t, 4H, *J* = 9.3 Hz), 7.58-7.38 (m, 8H), 7.00 (t, 2H, *J* = 7.5, 7.2 Hz), 7.00 (t, 1H, *J* = 7.1 Hz) and 6.47 (s, 1H). ^{13}C NMR ($CDCl_3$, 75 MHz): δ= 147.25, 142.90, 130.42, 130.87, 126.70, 126.76, 126.38, 127.20, 125.56, 126.11, 123.10, 120.63, 116.28, 115.38 and 37.42 ppm.

*14-(4-Nitrophenyl)-14H-dibenzo [a, j] xanthene (**2b**)*: Yield 98%, mp. 314-316 ˚C. FTIR (KBr, cm^{-1}): 3068 (Ar-H stretch), 2924 (C-H stretch), 1635 (C=C stretch). ^{1}H NMR ($CDCl_3$, 300 MHz): δ= 8.00 (d, 2H, *J* = 8.2 Hz), 7. 91 (d, 2H, *J* = 8.5 Hz), 7.5-7.38 (m, 4H), 7.56-7.40 (m, 8H) and 6.20 (s, 1H). ^{13}C NMR ($CDCl_3$, 75 MHz): δ= 140.18, 127.39, 126.18, 127.10, 126.87, 126.02, 125.98, 123.10, 122.88, 120.84, 120.45, 115.25, 113.48 and 33.37 ppm.

*14-(4-Cyanophenyl)-14H-dibenzo [a, j] xanthene (**2c**):* Yield 98%, mp. 293-294 ˚C. FTIR (KBr, cm^{-1}): 3072 (Ar-H stretch), 2921 (C-H stretch), 2220 (C≡N stretch), 1618 (C=C stretch). ^{1}H NMR ($CDCl_3$, 300 MHz): δ= 8.25 (d, 2H, *J* = 8.4 Hz), 7.80 (m, 4H), 7.61-7.39 (m, 10H) and 6.52 (s, 1H). ^{13}C NMR ($CDCl_3$, 75 MHz): δ= 150.00, 147.87, 131.80, 130.51, 130.30, 128.90, 129.59, 128.29, 126.68, 124.12, 122.47, 117.91, 117.38, 115.75, 109.31 and 36.76 ppm.

*14-(4-Trifluoromethylphenyl)-14H-dibenzo [a, j] xanthene (**2d**):* Yield 98%, mp. 260-261 ˚C. FTIR (KBr, cm^{-1}): 3055 (Ar-H stretch), 2959 (C-H stretch), 1616 (C=C stretch). ^{1}H NMR ($CDCl_3$, 300 MHz): δ= 8.28 (d, 2H, *J* = 8.1 Hz), 7.83-7.77 (m, 4H), 7.60-7.38 (m, 10H) and 6.52 (s, 1H). ^{13}C NMR ($CDCl_3$, 75 MHz): δ= 148.81, 146.56, 129.22, 129.00, 128.09, 127.51, 126.08, 126.89, 125.31, 123.52, 123.48, 122.78, 121.19, 116.08, 114.75 and 35.18 ppm.

*14-(3-Nitrophenyl)-14H-dibenzo [a, j] xanthene (**2e**):* Yield 95%, mp. 212-214 ˚C. FTIR (KBr, cm^{-1}): 3080 (Ar-H stretch), 2924 (C-H stretch), 1620 (C=C stretch), 1527 (N=O stretch), 1455 (C-H bend), 1342 (N=O bend). ^{1}HNMR ($CDCl_3$, 300 MHz) δ= 8.39 (s, 1H), 8.28 (d, 2H, *J* = 8.1 Hz), 7.85-7.78 (m, 6H), 7.61 (t, 2H, *J* = 7.3, 7.6 Hz), 7.51-7.39 (m, 4H), 7.29-7.25 (m, 1H) and 6.58 (s, 1H). ^{13}CNMR ($CDCl_3$, 75 MHz) δ= 148.11, 147.56, 146.32, 133.69, 130.40, 128.87, 128.91, 128.38, 126.64, 123.96, 120.45, 121.38, 121.08, 117.48, 115.24 and 37.07 ppm.

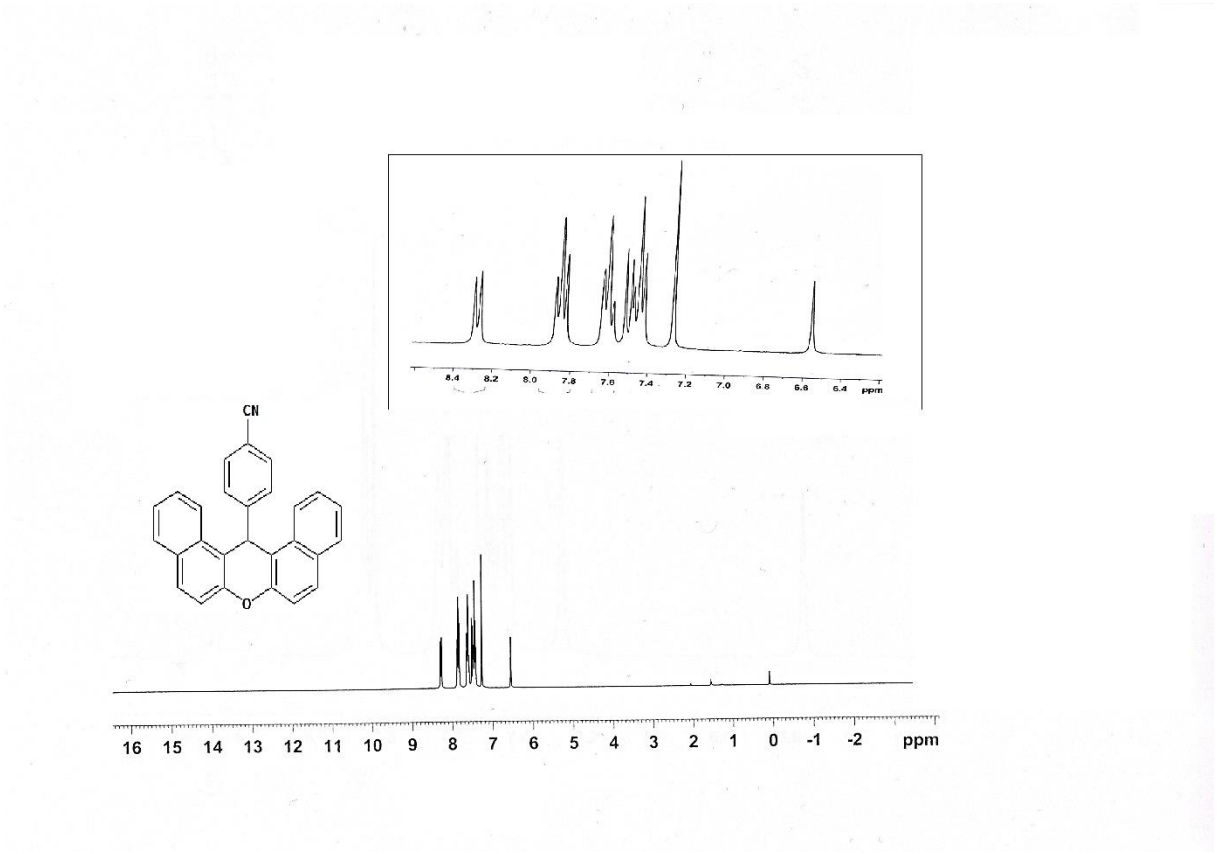

Figure S1. 400 MHz ^{1}H-NMR spectrum of compound **2c**

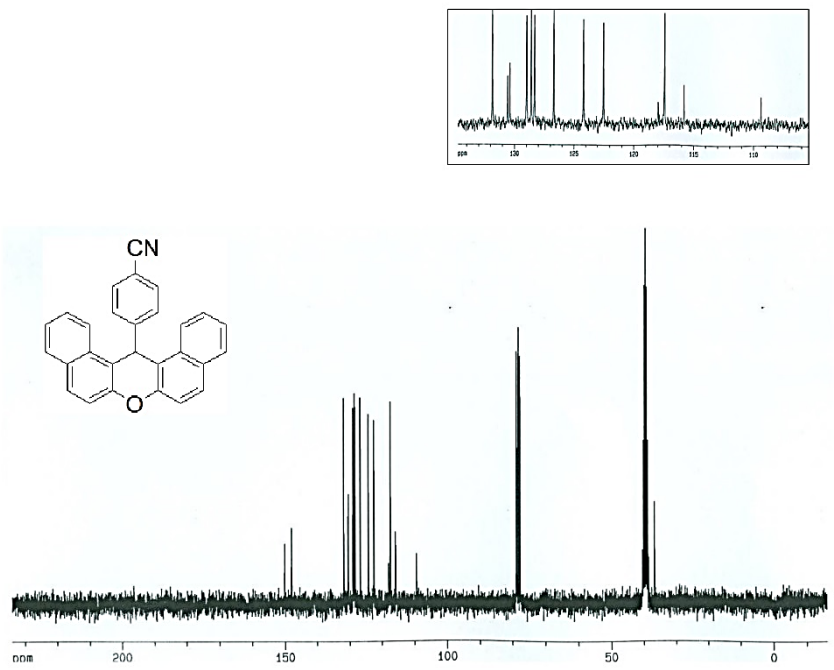

Figure S2. 100 MHz ^{13}C-NMR spectra of compound **2c**

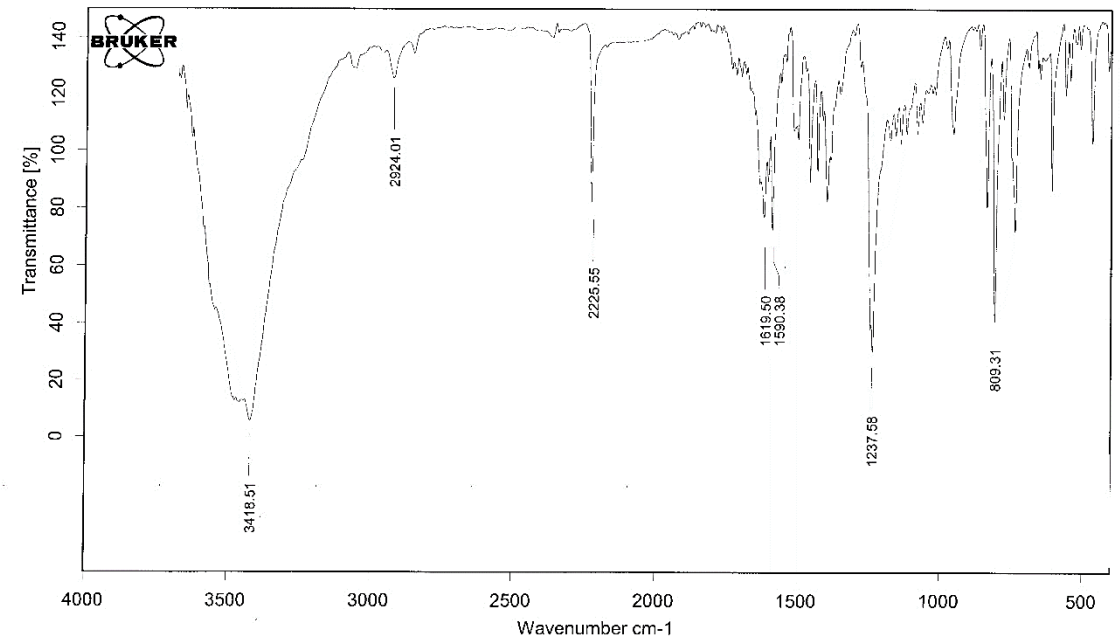

Figure S3. FT-IR spectrum of compound **2c**

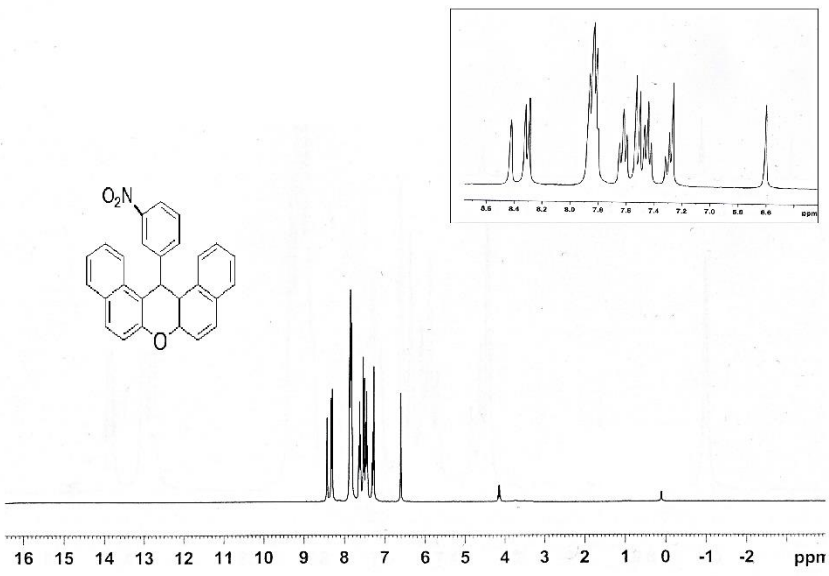

Figure S4. 400 MHz ^{1}H-NMR spectrum of **2e**

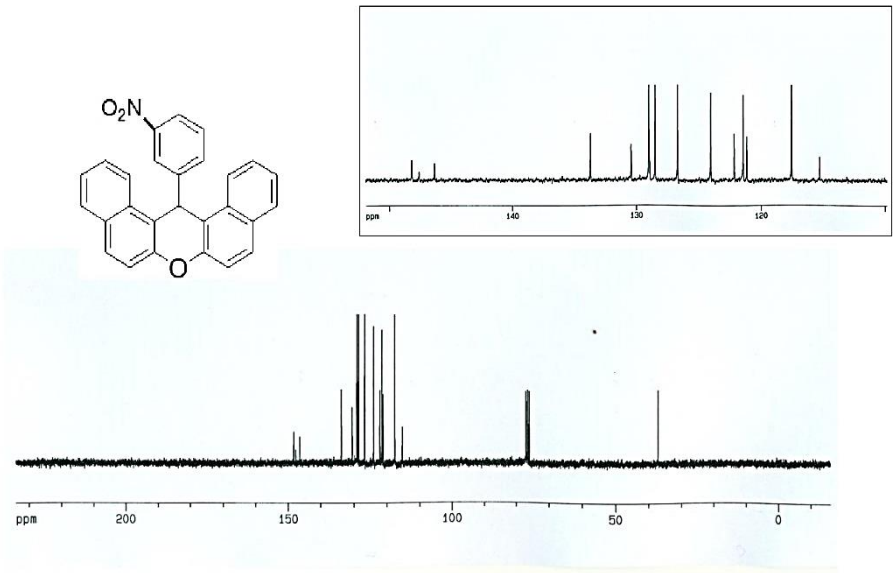

Figure S5. 100 MHz ^{13}C-NMR spectrum of **2e**

Figure S6. FT-IR spectrum of compound **2e**

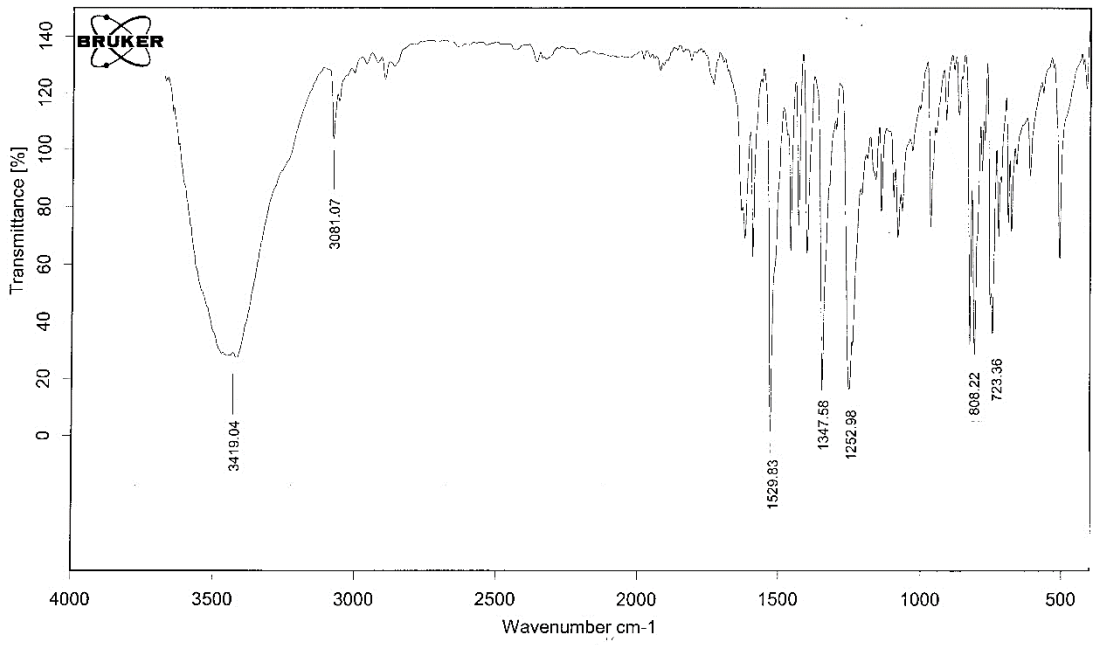

Figure S6. FT-IR spectrum of compound **2e**