

Supplementary Data

For

A novel molecularly imprinted quartz crystal microbalance sensor based on erbium molybdate incorporating sulphur-doped graphitic carbon nitride for dimethoate determination in apple juice samples

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Instrumentation

Some analytical devices for the morphological analyzes such as ZEISS EVO 50 SEM (Tokyo, Japan) for field emission scanning electron microscopy (FESEM), JEOL 2100 TEM/HRTEM instrument for transmission electron microscopy (TEM), Rikagu Miniflex, x-ray diffractometer (Tokyo, Japan) for x-ray diffraction analysis (XRD), Bruker-Tensor 27 FTIR spectrometer (Tokyo, Japan) for fourier-transform infrared spectroscopy (FTIR), PHI 5000 Versa Probe type x-ray photoelectron spectrometer (Japan/USA) for x-ray photoelectron spectroscopy (XPS), AFM Park NX10 (Japan) for atomic force microscopy (AFM), Thermo Fisher Scientific UV-Vis/Vis instrumentation for UV-Vis spectra, GAMRY Reference 600 workstation for electrochemical impedance spectroscopy (EIS), and cyclic voltammetry (CV) were applied in present study.

Sensitivity

$$LOQ = 10.0 S / m$$

$$LOD = 3.3 S / m$$

S: Standard deviation of the intercept and m: Slope of the regression line

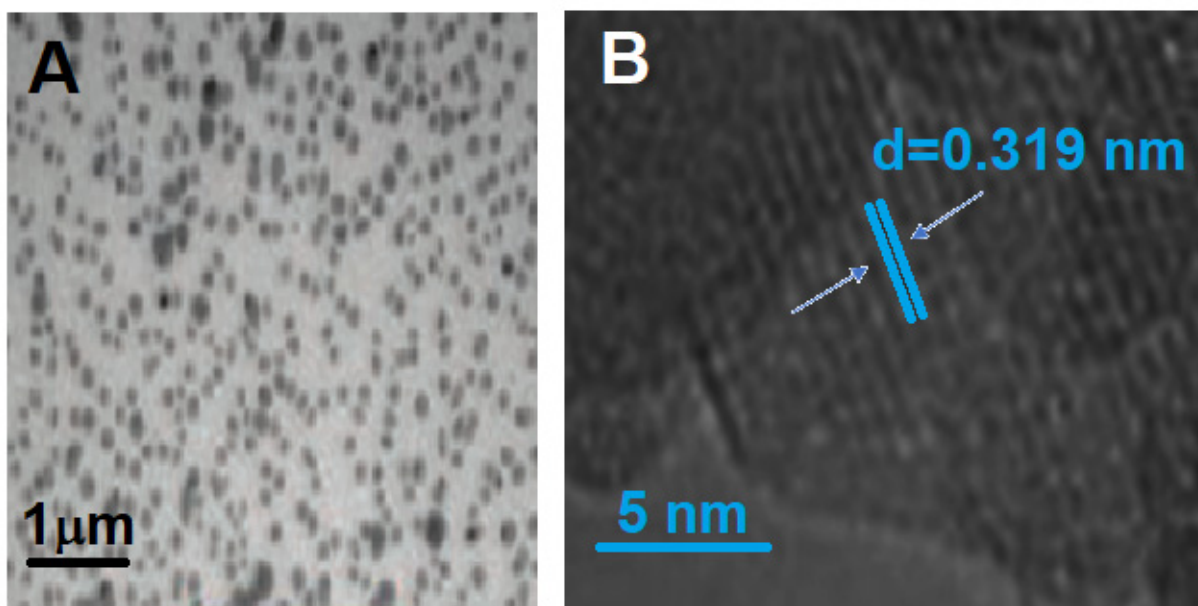


Figure S1. TEM image (A) of EM/S-g-C₃N₄ nanocomposite and HRTEM image (B) of EM/S-g-C₃N₄ nanocomposite

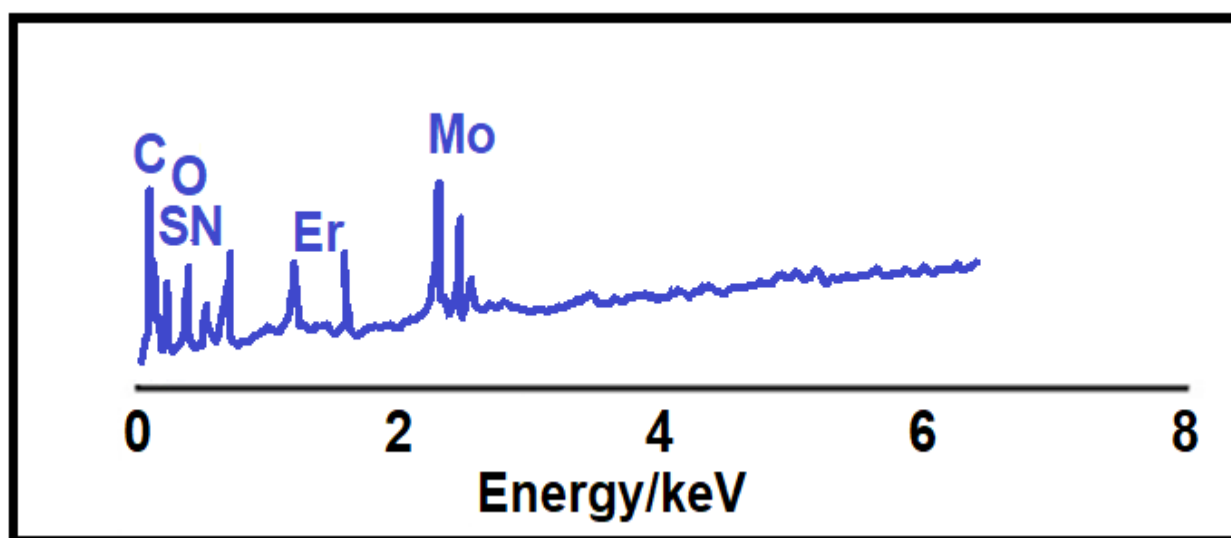


Figure S2. EDX spectrum of of EM/S-g-C₃N₄ nanocomposite

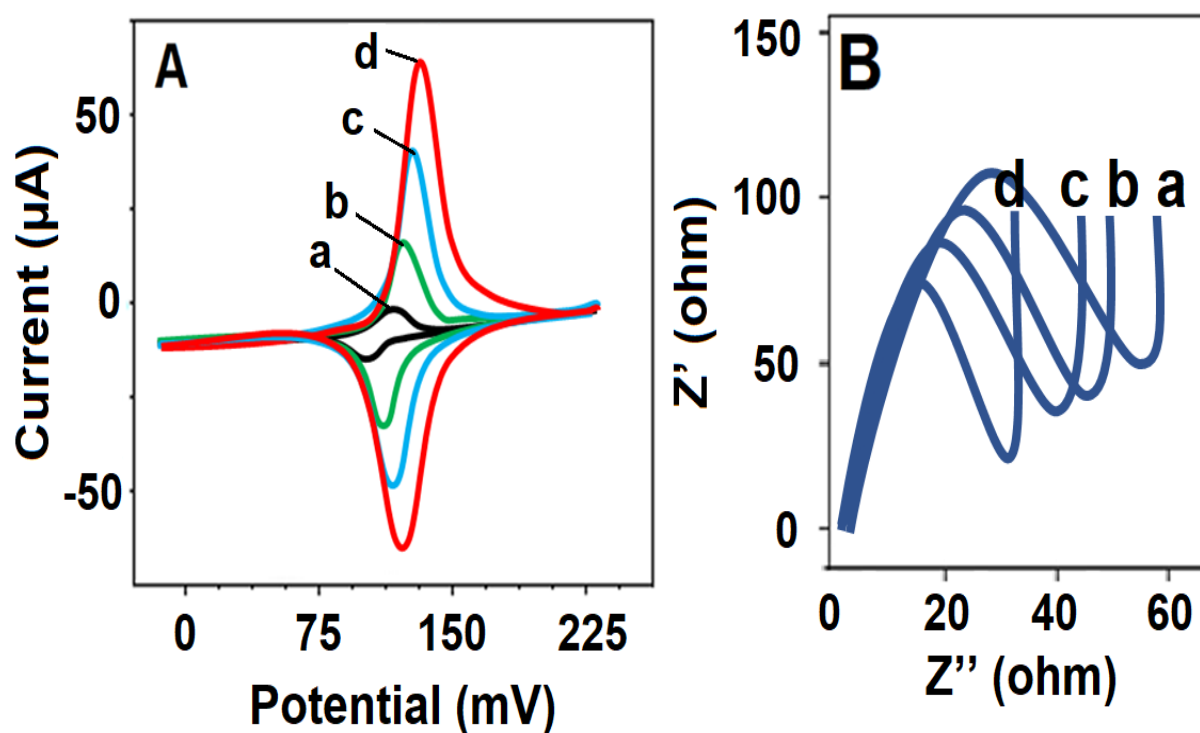


Figure S3. (A) CV curves and (B) EIS responses at (a) bare GCE, (b) EM/GCE, (c) S-g-C₃N₄/GCE, (d) EM/S-g-C₃N₄/GCE (Redox probe: 1.0 mM [Fe(CN)₆]^{3-/4-} containing 0.1 M KCl, potential scan rate: 50 mV/s)

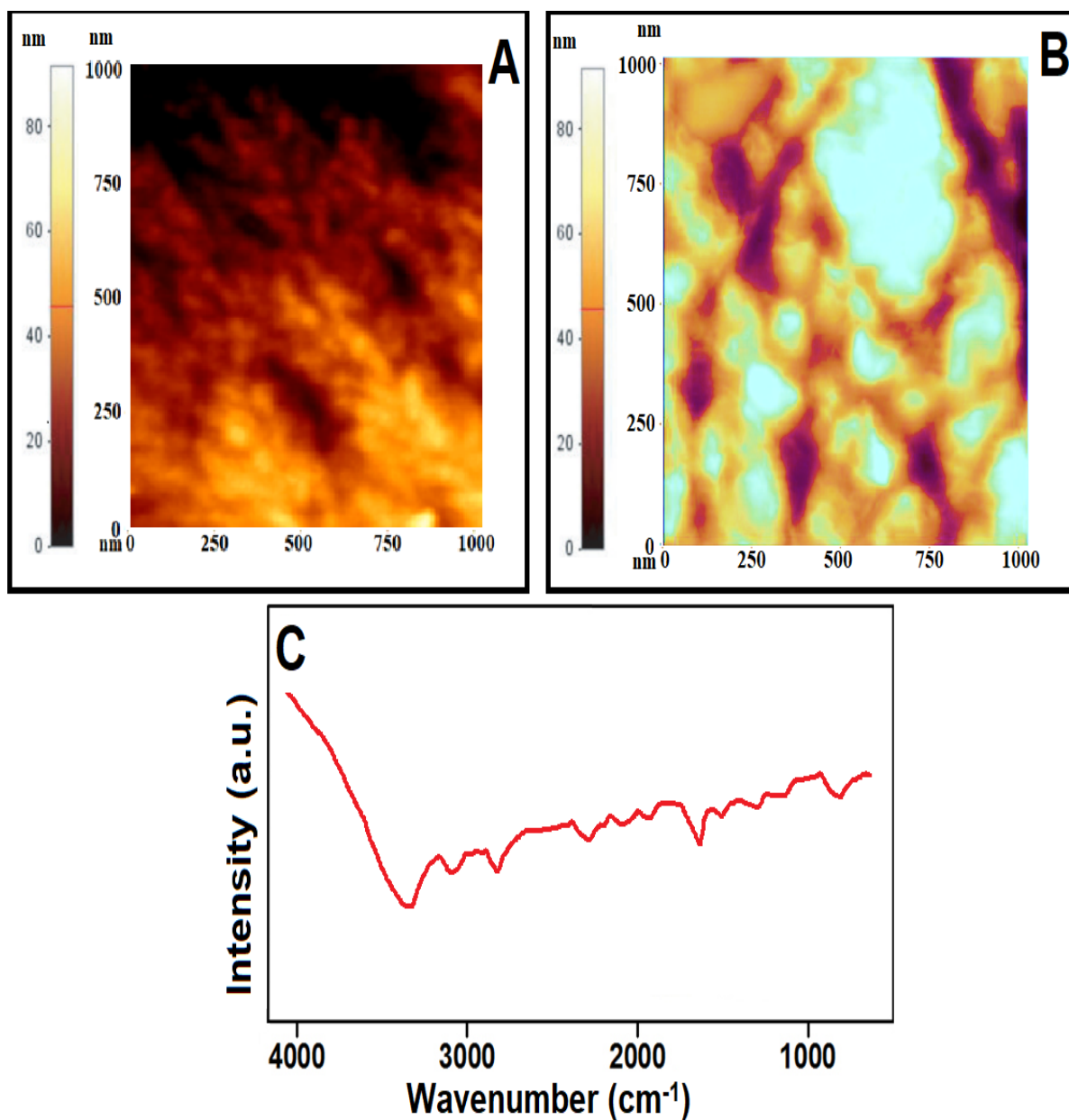


Figure S4. AFM images of (A) bare QCM chip, (B) the molecularly imprinted film on EM/S-g-C₃N₄/QCM and (C) FTIR spectrum of molecularly imprinted film on EM/S-g-C₃N₄/QCM

Table S1. Recovery results of DIM ($n=6$)

Sample	Added DIM (nM)	Found DIM (nM)	Recovery (%)
Apple Juice	-	0.64 ± 0.01	-
	2.00	2.63 ± 0.03	99.62 ± 0.08
	4.00	4.65 ± 0.09	100.22 ± 0.03
	6.00	6.65 ± 0.07	100.15 ± 0.05

Recovery = Found DIM, nM / Real DIM, nM

Table S2. k and k' values of DIM imprinted QCM chips (MIP/EM/S-g-C₃N₄/QCM and NIP/EM/S-g-C₃N₄/QCM) ($n=6$)

	MIP		NIP		k'
	Δm (nM cm ² -)	k	Δm (nM cm ² -)	k	
DIM	20.15 ± 0.01	-	1.05 ± 0.03	-	-
ACE	0.50 ± 0.03	40.30	0.25 ± 0.02	4.20	9.60
TRI	0.40 ± 0.07	50.38	0.20 ± 0.04	5.25	9.60
HEX	0.30 ± 0.08	67.17	0.10 ± 0.07	10.50	6.40
FEN	0.20 ± 0.09	100.75	0.05 ± 0.06	21.00	4.80
DDT	0.10 ± 0.05	201.50	0.01 ± 0.06	105.00	1.92

Analyte concentrations: 10.0 nM DIM, 1000.0 nM ACE, 1000.0 nM TRI, 1000.0 nM HEX, 1000.0 nM FEN, 1000.0 nM DDT

$k = \Delta m_{\text{DIM}} / \Delta m_{\text{interfering chemical}}$ and $k' = k_{\text{MIP}} / k_{\text{NIP}}$