Tritopic Linker-Integrated Fluorescent Bismuth Nanosheets for Sensitive Pesticide Detection in Agricultural Samples

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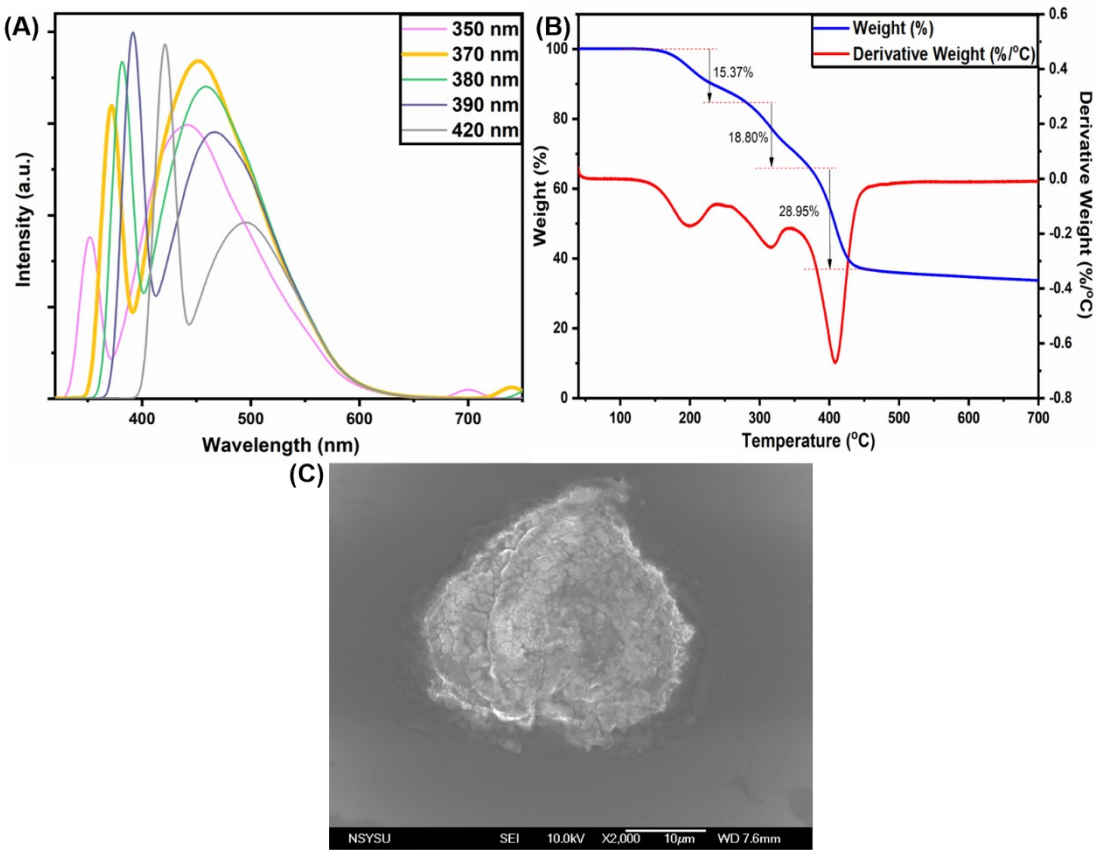

Figure S1. (A) PL emission response of Bi(TMA) under different excitation wavelengths (B) Thermo gravimetric analyses (TGA) of Bi(TMA) NSs (C) SEM image for Bi(TMA) NSs.

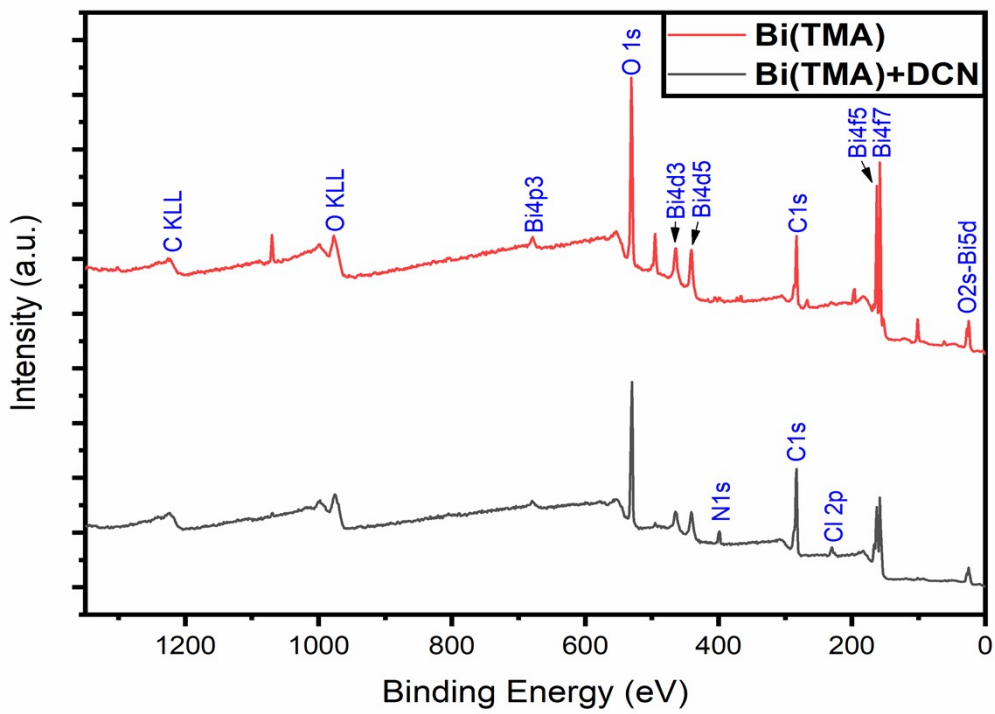

Figure S2. Survey scan of XPS spectrum for the Bi(TMA) NSs before and after adding DCN.

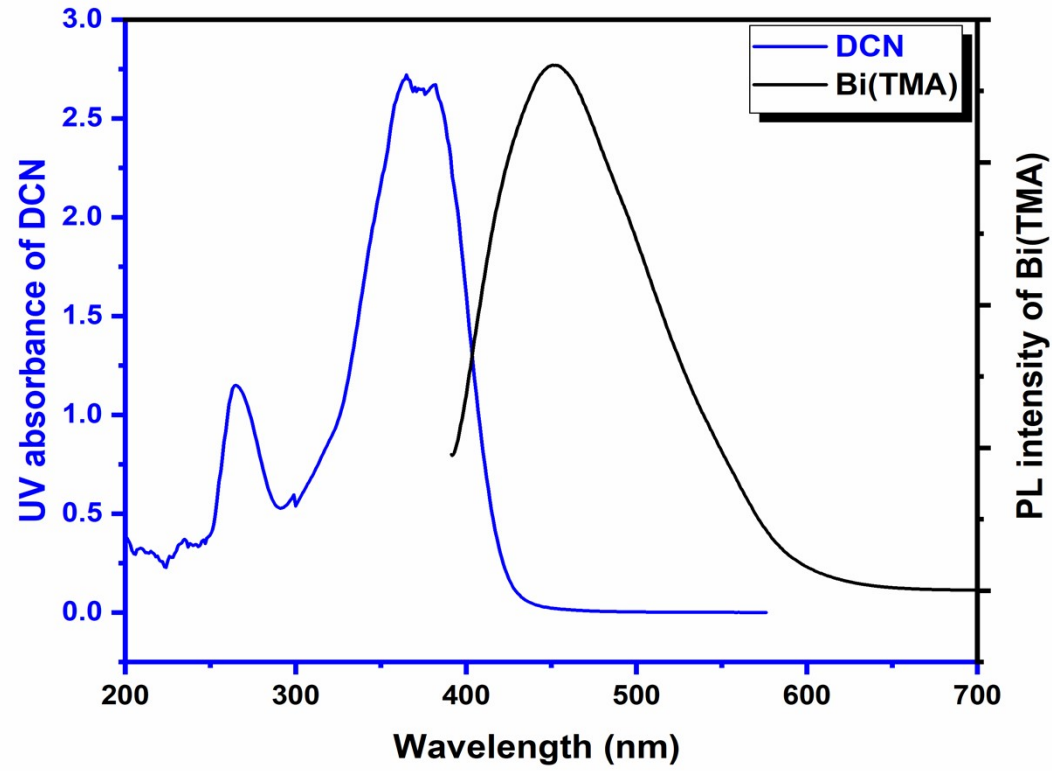

Figure S3. Combined spectra for UV absorbance of DCN and PL emission of Bi(TMA); the Y-axis of left side is the UV absorption, and the Y-axis of right side is the PL intensity.

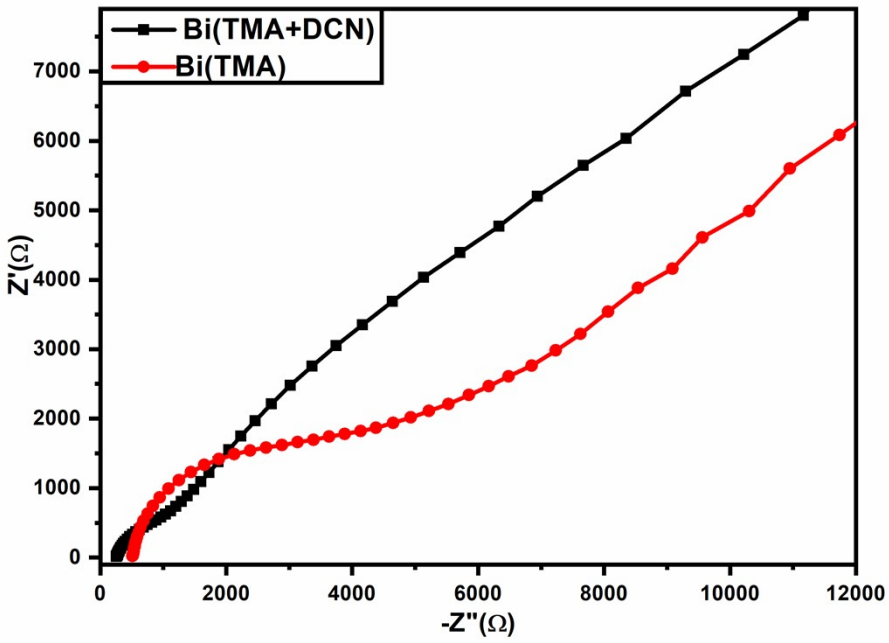

Figure S4. Electrochemical kinetics study for Bi(TMA) before and after adding DCN using EIS.

EIS Calculations:

$$K^0=RT/n^2F^2ACR_{ct}$$

Constants & conversions used

R=8.314462618 $Jmol^{-1}K^{-1}$

T=298.15 K (room temp)

n=1

F=96500 $Cmol^{-1}$

C=0.005 M=0.005 $molL^{-1}$=5.0 $molm^{-3}$

electrode area A=7.065 mm^2=7.065×10^{-6} m^2

Rct(Bi–TMA)=4.35 kΩ=4350 Ω

Rct(Bi–TMA+DCN)=958 Ω

$$\mathbf{K^0(Bi–TMA)}= 8.314462618\times298.15/\ (1)^2(96500)^2(7.065\times10^{-6})(5.0)(4350)$$

$$\approx1.73\times10^{-6}\ s^{-1}$$

$$\mathbf{K^0(Bi–TMA+DCN)}\ _{\mathbf{complex}}= \approx7.87\times10^{-6}\ s^{-1}$$

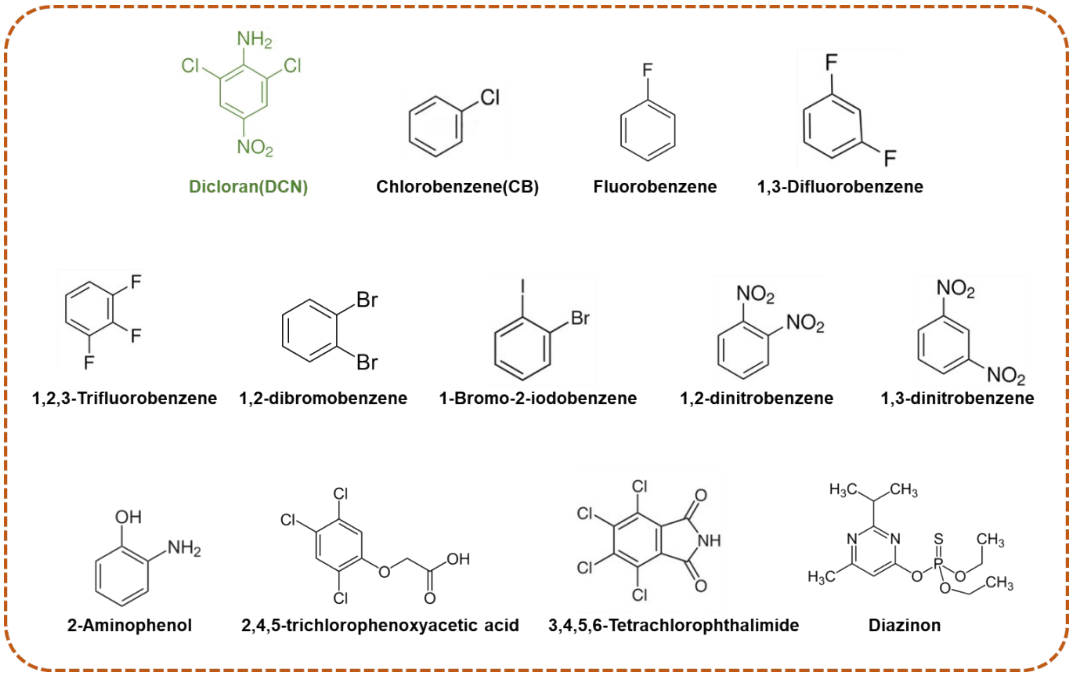

Figure S5. Structures of all analytes used in this study, the green color of the compound is the DCN.

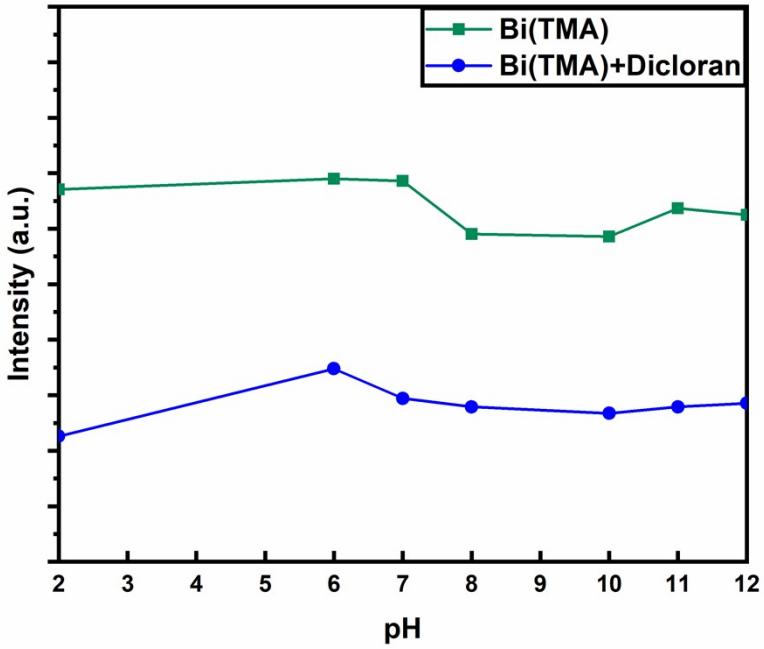

Figure S6. pH studies of the 2D Bi(TMA) with and without the addition of the DCN**.**

Table S1. **The table of safe tolerance of pesticide residues of compared with the standard values of R.O.C (Taiwan).**

Food	**MRLs**	
Scallion	**2.0 ppm**	**10.6 µM**
Peanut	**0.1 ppm**	**0.5 µM**

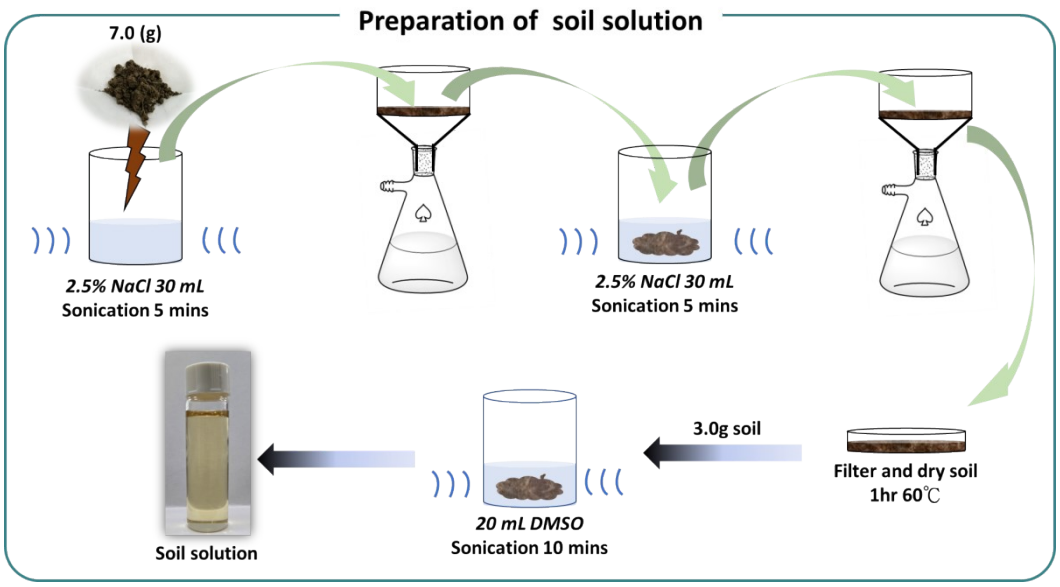

Figure S7. A schematic diagram for the real sample preparation from soil.

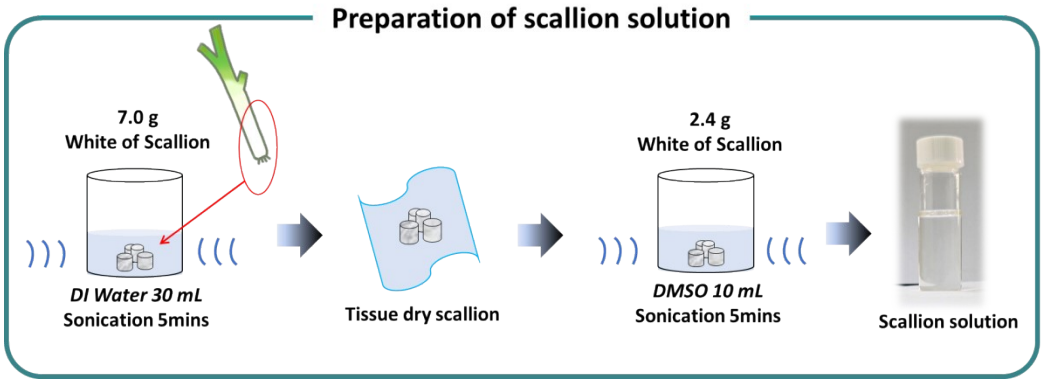

Figure S8. A schematic diagram for the real sample preparation from scallion.

LOD Calculations:

$y = 0.00258x + 0.02194$

Slope = 0.4127

SD = Intercept/1000

$$LOD = 3.3 \times \frac{S.D}{Slope}$$

$$LOD = 3.3 \times \frac{0.02194/1000}{0.00258}$$

LOD = **0.03 nM**