

SUPPLEMENTARY INFORMATION

Cu-BTC@Cotton Composite: Design and Removal of Ethion Insecticide from Water

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Chemicals and materials

Copper (II) nitrate trihydrate ($\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$, >99%, s. d. Fine-Chem Ltd, Mumbai – India), benzene-1, 3, 5-tricarboxylic acid (99%, Aldrich, Darmstadt–Germany), ethanol/N, N-dimethylformamide (DMF, 99.9%, Aldrich, Darmstadt–Germany), ^{14}C -ethanol (Sp. Act. 37 MBq, Amersham, England), phosphorus pentasulfide (99.9%, Aldrich, Darmstadt–Germany), methylene chloride (Fisher Scientific, Pittsburgh, PA–USA), sodium carbonate monohydrate ($\text{NaHCO}_3 \cdot \text{H}_2\text{O}$, 99%, Egyptian company for chemicals and pharmaceuticals, 10th of Ramadan-Egypt) hydrogen peroxide (H_2O_2 , 50%, Egyptian company for chemicals and pharmaceuticals, 10th of Ramadan-Egypt), sodium silicate ($\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$, Loba Chemie Pvt.Ltd, Mumbai–India) and sodium hydroxide (NaOH, 99%, Egyptian company for chemicals and pharmaceuticals, 10th of Ramadan–Egypt) were all used as received without any purification.

Desized, scoured and bleached plain-woven 100% cotton fabrics (160 gm/m², with 35 and 30 threads per cm along warp and weft directions, respectively) were kindly supplied from El-

Mahalla Company for Spinning and Weaving, El-Mahalla El-Kubra – Egypt. To remove the impurities, fabrics were washed with solution contained 2 g/L Na₂CO₃ using 1:50 material to liquor ratio at 60 °C for 30 minute. Washed fabrics were rinsed two times by cold tap water and then dried on air at room temperature.

Characterization of the Materials

The morphologies of the synthesized products were characterized using a scanning electron microscope (SEM, Hitachi SU-70) equipped with an energy dispersive X-ray spectrometer (EDX). The synthesized samples were subjected to X-ray diffraction (XRD, Philips X'Pert MPD diffractometer) by a diffractometer equipped with the graphite monochromatized Cu K α radiation, $\lambda = 1.5406 \text{ \AA}$) in 2θ angles ranging from 5° to 50° with a step size of 0.05° and scanning rate 1 s.

MOF and fabrics were both characterized using a Mattson 5000 spectrometer in the wavenumber range of 4000–350 cm⁻¹ in transmission mode. For MOF material, Fourier transform infrared (FTIR) spectroscopy was performed. Sample was prepared by adding the MOF (1–2 mg) to KBr (200 mg). The mixture was then carefully mixed and compressed at a pressure of 10 kPa to form transparent pellets. FTIR was attached to attenuated total reflectance (ATR) unit with diamond (platinum) crystal and then Cu-BTC@Cotton fabric sample was subjected to ATR-FTIR spectroscopy.

Copper contents onto Cu-BTC@Cotton composite and water solution after adsorption were performed on an HORIBA Jobin Yvon Activa Minductively coupled plasma atomic emission spectroscope (ICP-AES).

Stability of Cu-BTC and Cu-BTC@cotton in contact with water

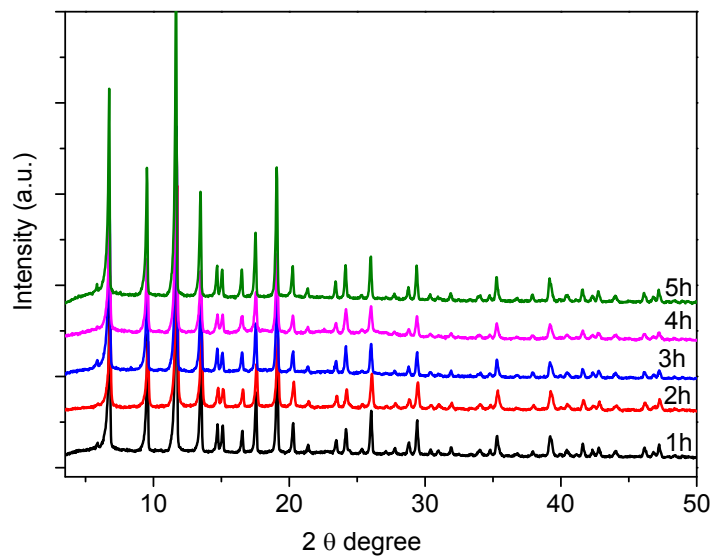


Figure S1. PXRD patterns for Cu-BTC after immersion in water at room temperature for 1, 2, 3, 4 and 5 h.

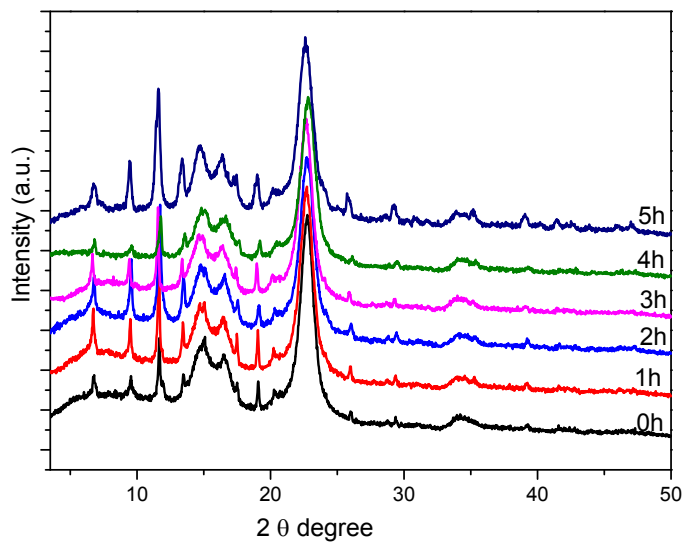


Figure S2. PXRD patterns for Cu-BTC@cotton after immersion in water at room temperature for 1, 2, 3, 4 and 5 h.