# Modification of Cotton Fabric with Molecularly Imprinted Polymer-Coated Carbon Dots as a Sensor for 17 $\alpha$-methyltestosterone

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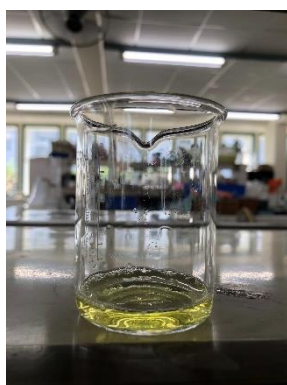[2] Chemistry for Green Society and Healthy Living Research Unit, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand
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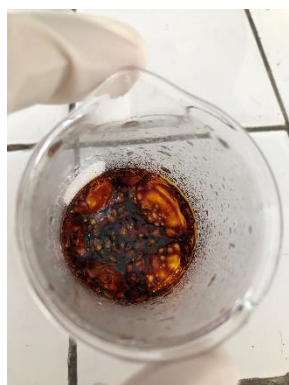
## Supplementary Data
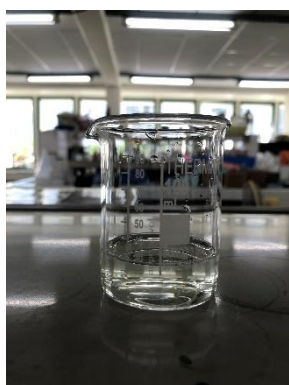


CA+H$_2$O 8 min

CA+EDA 5 min

CA+EDA 8 min



CA+EDA 9 min

CA+EDA 10 min

**Figure S1**. Images of the obtained EDA-CDs with various exposure times at 300W.
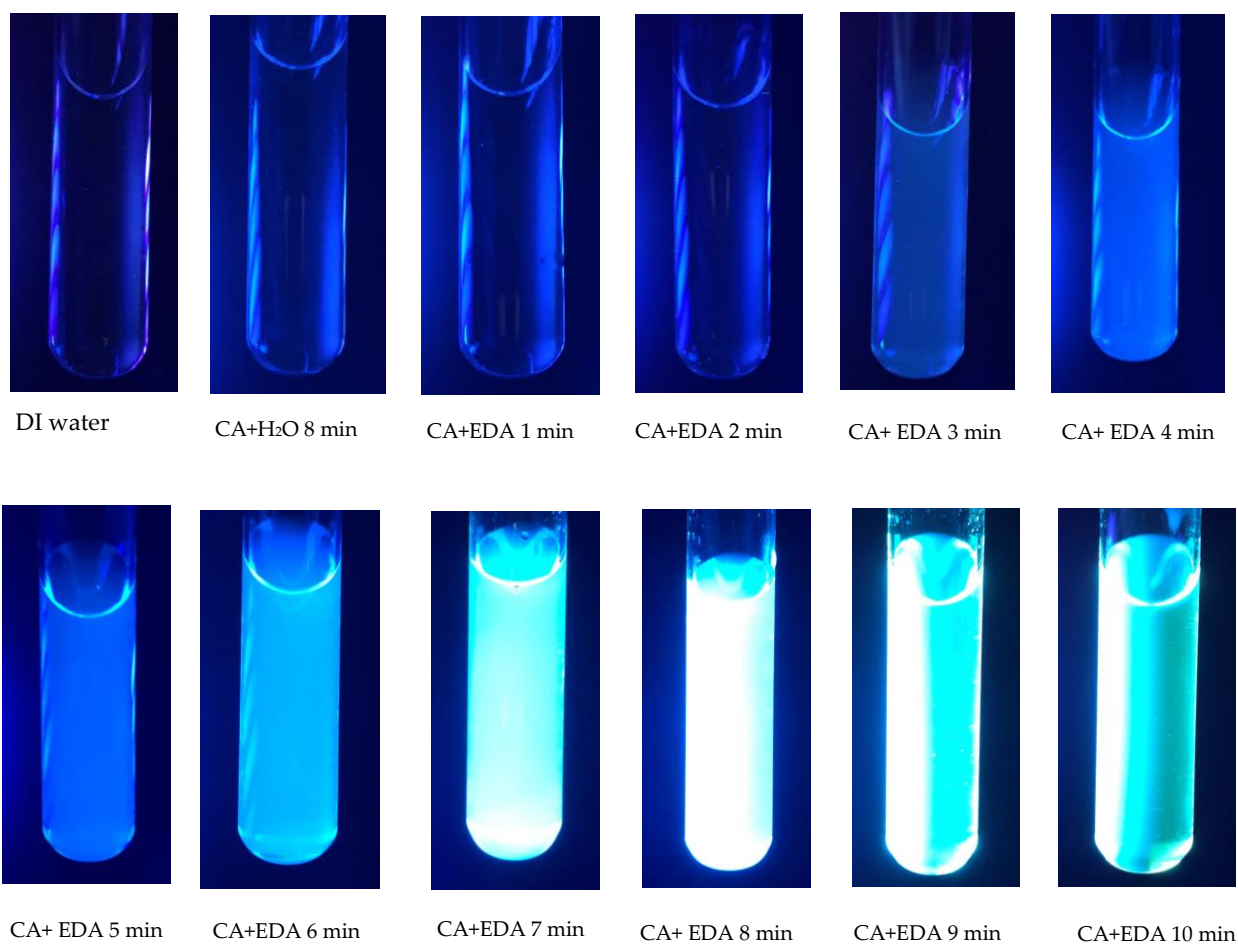
**Figure S2**. Images of carbon dots solution (1000 mg/L) with various exposure times from 1 to 10 min at 300 W under UVA radiation.
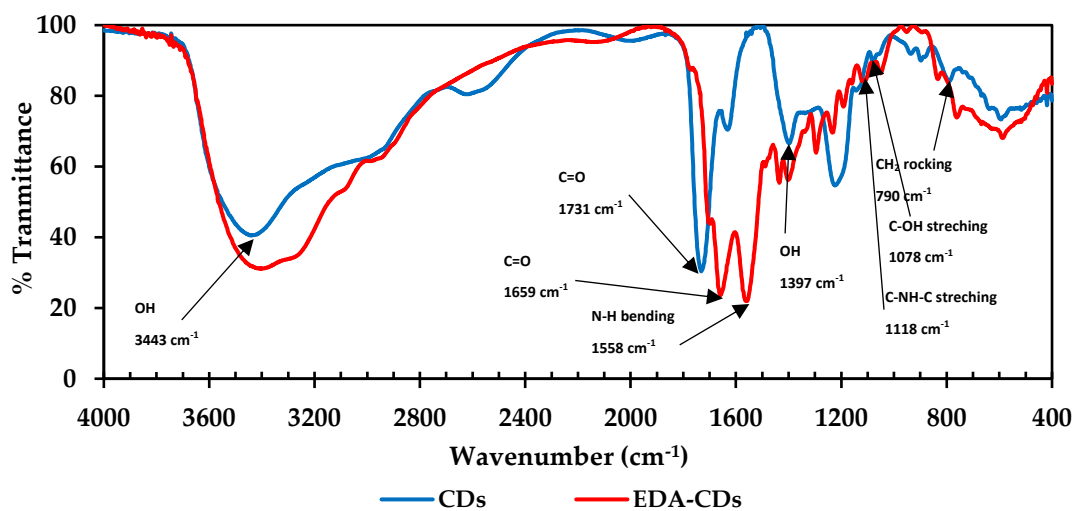
**Figure S3.** FTIR spectra of CDs (blue) andEDA-CDs (red) from synthesis using a microwave at 300 W for 8 min.
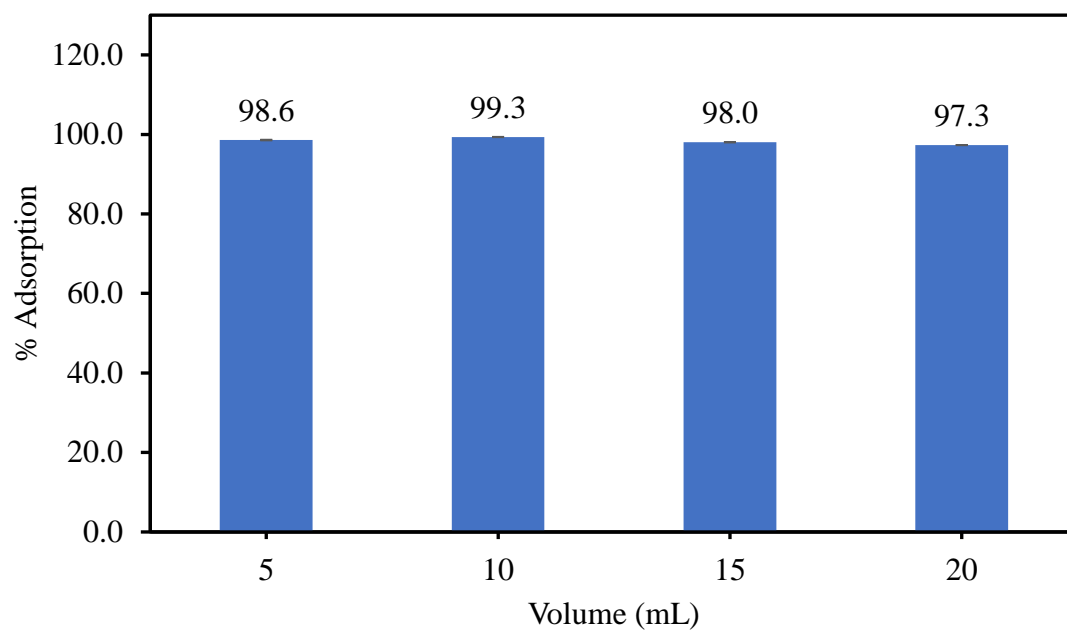
**Figure S4**. % Adsorption of the EDA-CDs grafted cotton fabric with various volumes of 1000 mg/L EDA-CDs for 10 min of sonication time.
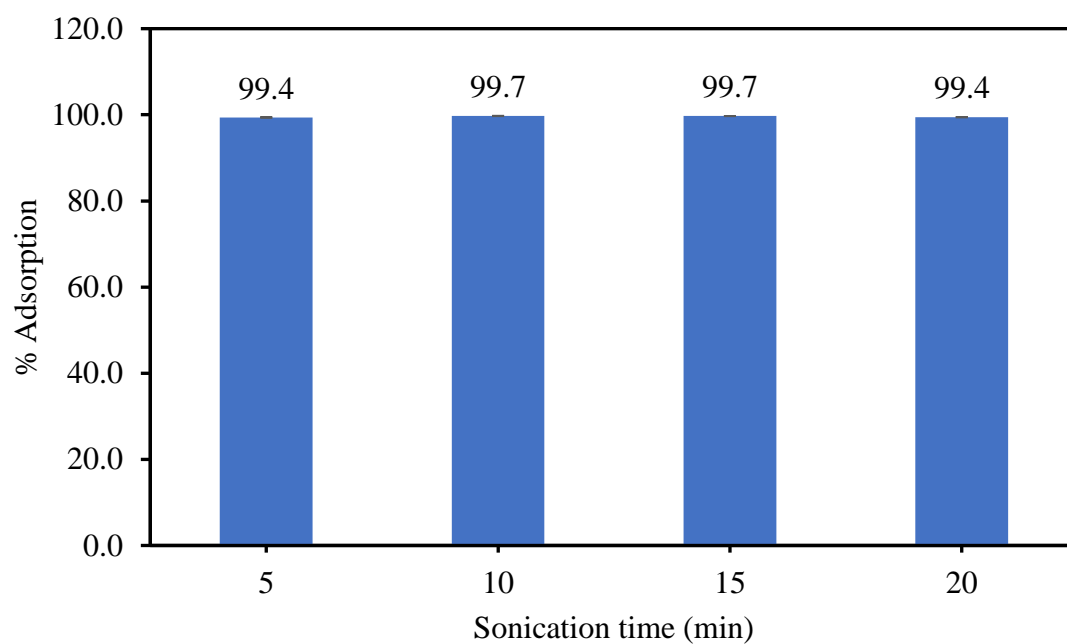


**Figure S5**. % Adsorption of the EDA-CDs grafted cotton fabric with various sonication times for 10 mL of 1000 mg/L EDA-CDs.

**Table S1.** Optimization for preparation of the EDA-CDs/CF.
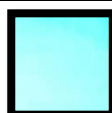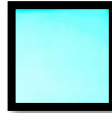
| Parameters | Gray Intensity (n=3) | Fluorescence Image |
|---|---|---|
| **Volume of the EDA-CDs solution (mL)** | | |
| 5 | 217±1.2 | |
| 10 | 227±1.3 | |
| 15 | 225±0.3 | |
| 20 | 222±0.3 | |
| **Sonication time (min)** | | |
| 5 | 222±2.7 | |
| 10 | 229±0.6 | |
| 15 | 225±0.4 | |
| 20 | 224±0.6 | |

**Table S2**. Optimization for preparation of the MIPs/MT@EDA-CDs/CF.
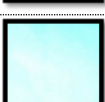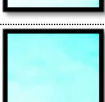
| Parameters | | | | | Gray intensity (n=3) | Fluorescence Image |
|---|---|---|---|---|---|---|
| MT concentration (mg/L) | MAA (μL) | EGDMA (μL) | AIBN (μL) | Polymerization time (hour) | | |
| 25 | 400 | 700 | 40 | 16 | 222 ± 5.6 | |
| **50** | | | | | 238 ± 4.5 | |
| 75 | | | | | 207 ± 2.4 | |
| 100 | | | | | 234 ± 2.9 | |
| 50 | **300** | 700 | 40 | 16 | 249 ± 2.9 | |
| | 400 | | | | 245 ± 0.8 | |
| | 500 | | | | 239 ± 11.9 | |
| | 600 | | | | 239 ± 5.87 | |
| 50 | 300 | 600 | 40 | 16 | 229 ± 2.3 | |
| | | **700** | | | 248 ± 0.2 | |
| | | 800 | | | 245 ± 2.7 | |
| | | 900 | | | 240 ± 2.0 | |

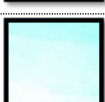**Table S2**. Optimization for preparation of the MIPs/MT@EDA-CDs/CF (Continue).

| Parameters | | | | | Gray intensity | Fluorescence Image |
|---|---|---|---|---|---|---|
| MT concentration (mg/L) | MAA (µL) | EGDMA (µL) | AIBN (µL) | Polymerization time (hour) | | |
| 50 | 300 | 700 | 30 | 16 | 225 ± 2.9 | |
| | | | 40 | | 245 ± 3.8 | |
| | | | **50** | | 250 ± 2.5 | |
| | | | 60 | | 246 ± 2.0 | |
| 50 | 300 | 700 | 50 | 16 | 242 ± 0.7 | |
| | | | | 18 | 248 ± 4.7 | |
| | | | | 20 | 249 ± 1.4 | |
| | | | | **22** | 251 ± 1.1 | |

**Table S3**. Optimization of desorption solvent to extract MT from the MIPs/MT@EDA-CDs/CF.

| Extraction Solvent | Gray Intensity | Elution efficiency (%) | Fluorescence Image |
|---|---|---|---|
| Control (NIP) | 157 ± 0.8 | - |  |
| Water | 170 ± 6.4 | - |  |
| **EtOH: ACN; 1:4** | 168 ± 0.1 | 98.3 |  |
| EtOH: ACN; 2:3 | 173± 1.8 | 96.3 |  |
| EtOH: ACN; 3:2 | 172± 0.9 | 93.8 |  |
| EtOH: ACN; 4:1 | 208± 3.3 | 82.1 |  |



Water      EtOH: ACN; 1:4      EtOH: ACN; 2:3      EtOH: ACN; 3:2      EtOH: ACN; 4:1
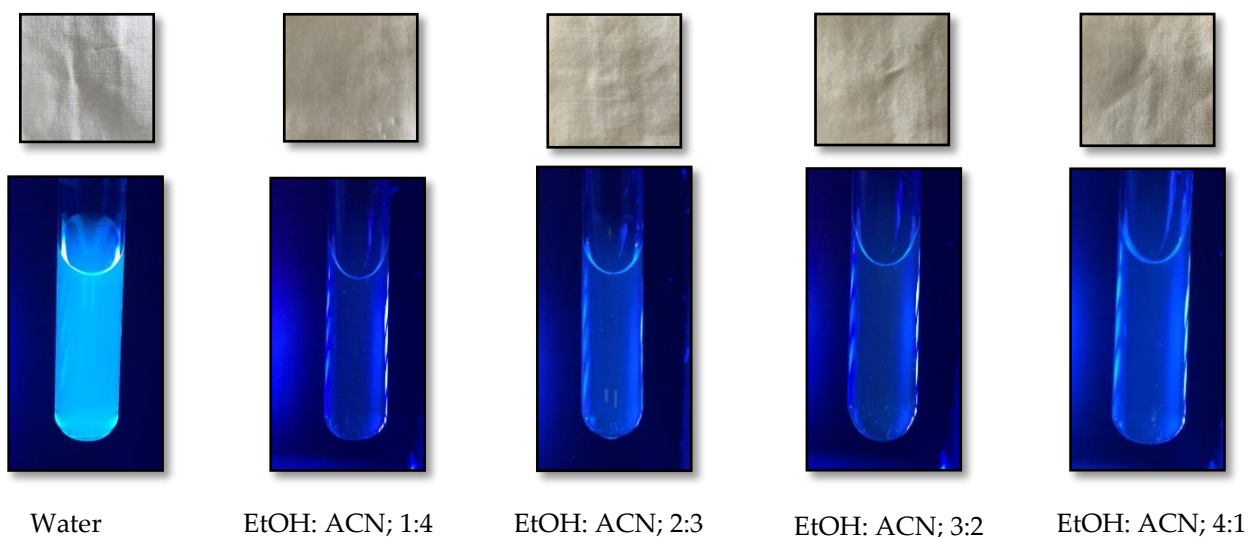
**Figure S6**. The original images of the MIPs@EDA-CDs/CF under normal light and the remaining solutions under UVA radiation.
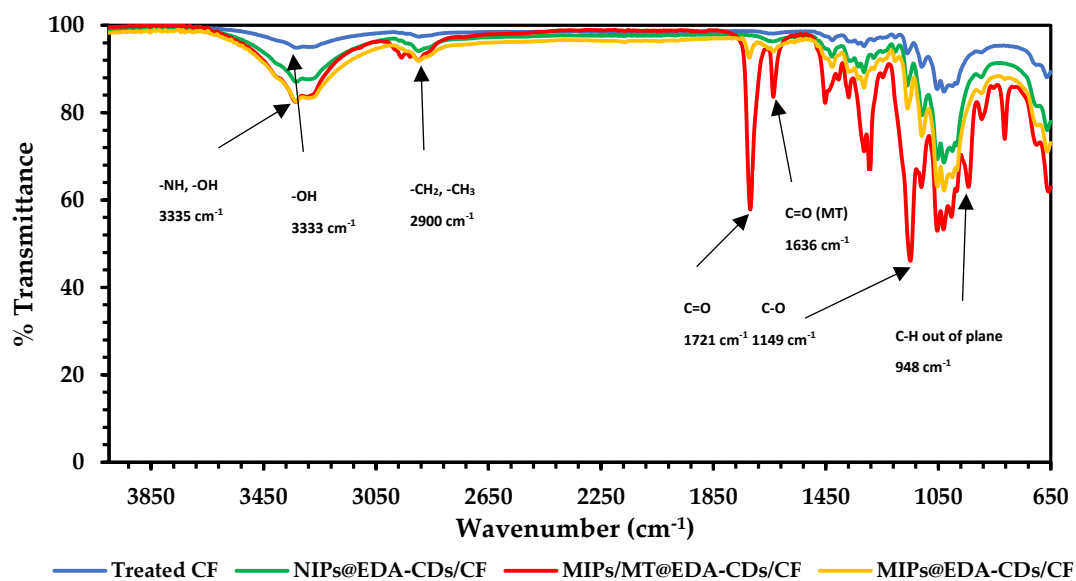
**Figure S7**. ATR-FTIR transmission spectra of treated cotton fabric, MIPs/MT@EDA-CDs/CF, NIPs@EDA-CDs/CF, MIP@EDA-CDs/CF

**Table S4.** RGB measurement of the MIPs/EDA-CDs/CF for MT detection at different concentration using smartphone-based image analysis.

| Concentration (μg/L) | Color intensity | | | |
|:---:|:---:|:---:|:---:|:---:|
| | Gray | Red | Green | Blue |
| 0 | 162 | 3 | 229 | 252 |
| 100 | 169 | 15 | 241 | 252 |
| 300 | 184 | 52 | 247 | 252 |
| 500 | 196 | 81 | 255 | 252 |
| 800 | 214 | 138 | 255 | 254 |
| 1000 | 227 | 175 | 254 | 251 |