Supporting information for

**Dependence of the photo-response behavior of self-assembled 2D Azo-derivatives on the functional groups on a solid surface**

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Materials and Syntheses:

All the azo molecules were synthesized as the reported process and characterized as following.1

**Azo-1**: 1.06 (m, 10H, (CH$_2$)$_5$), 1.45 (m, 4H, OCH$_2$CH$_2$CH$_2$CH$_2$COO), 1.73 (m, 2H, OCH$_2$CH$_2$), 2.12 (t, 2H, CH$_2$COO), 4.06 (t, 2H, OCH$_2$), 6.99 (d, 2H, phenyl), 7.43 (t, 1H, phenyl), 7.50 (t, 2H, phenyl), 7.86 (d, 2H, phenyl), 7.90 (d, 2H, phenyl). ESI-MS: calculated: C$_{23}$H$_{30}$N$_2$O$_3$ = 382.50, found: m/z = 380.92 (M-1).

**para-Azo**: 0.88 (t, 3H, CH$_3$), 1.27 (m, 16H, (CH$_2$)$_8$), 1.48 (m, 2H, OCH$_2$CH$_2$CH$_2$), 1.83 (m, 2H, OCH$_2$CH$_2$), 4.05 (t, 2H, OCH$_2$), 7.02 (d, 2H, phenyl), 7.93 (m, 4H, phenyl), 8.16 (d, 2H, phenyl). ESI-MS: calculated: C$_{25}$H$_{34}$N$_2$O$_3$ = 410.55, found: m/z = 409.01 (M-1).

**meta-Azo**: 0.88 (t, 3H, CH$_3$), 1.27 (m, 16H, (CH$_2$)$_8$), 1.42 (m, 2H, OCH$_2$CH$_2$CH$_2$), 1.74 (m, 2H, OCH$_2$CH$_2$), 3.90 (t, 2H, OCH$_2$), 6.83 (m, 2H, phenyl), 7.74 (t, 4H, phenyl), 8.04 (t, 1H, phenyl), 8.46 (s, 1H, phenyl). ESI-MS: calculated: C$_{25}$H$_{34}$N$_2$O$_3$ = 410.55, found: m/z = 409.02 (M-1).

**ortho-Azo**: 0.88 (t, 3H, CH$_3$), 1.27 (m, 16H, (CH$_2$)$_8$), 1.49 (m, 2H, OCH$_2$CH$_2$CH$_2$), 1.75 (m, 2H, OCH$_2$CH$_2$), 2.19 (t, 2H, CH$_2$COO), 4.09 (t, 2H, OCH$_2$), 7.08 (d, 2H, phenyl), 7.66 (m, 2H, phenyl), 7.89 (d, 2H, phenyl), 8.02 (d, 1H, phenyl), 8.43 (d, 1H, phenyl). ESI-MS: calculated: C$_{25}$H$_{34}$N$_2$O$_3$ = 410.55, found: m/z = 408.97 (M-1).

References

Large scale of STM images for Azo molecules:

Figure S1. Large scale STM images of Azo-1 molecule assembled structure on the 1-phenyloctane/HOPG interface before (a) and after UV irradiation (b). (a) $I_{\text{set}} = 200.2$ pA, $V_{\text{bias}} = 399.5$ mV; (b) $I_{\text{set}} = 150.0$ pA, $V_{\text{bias}} = 399.8$ mV.

Figure S2. Large-scale STM images of ortho-Azo molecule self-assemblies on the 1-phenyloctane/HOPG interface before (a) and after UV irradiation (b). (a) $I_{\text{set}} = 299.0$ pA, $V_{\text{bias}} = 698.5$ mV; (b) $I_{\text{set}} = 119.0$ pA, $V_{\text{bias}} = 349.7$ mV.
**Figure S3.** Large scale STM images of *meta*-Azo molecule self-assemblies on the 1-phenyloctane/HOPG interface before (a) and after UV irradiation (b) condition. (a) $I_{\text{set}} = 296.0$ pA, $V_{\text{bias}} = 698.0$ mV; (b) $I_{\text{set}} = 100.0$ pA, $V_{\text{bias}} = 299.6$ mV.

**Figure S4.** Large scale STM images of *para*-Azo molecule self-assemblies on the 1-phenyloctane/HOPG interface before (a) and after UV irradiation (b). (a) $I_{\text{set}} = 80.0$ pA, $V_{\text{bias}} = 356.4$ mV; (b) $I_{\text{set}} = 112.0$ pA, $V_{\text{bias}} = 332.0$ mV.