High efficient photodimerization of the olefin in a nanotemplateon HOPG by scanning tunneling microscopy

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1. Light system for irradiation experiment



Figure S1. Spectral of Xenon lamp with filter at 365 nm.

STM image of *trans*-2(4,4'-bpe)·2(iso-pa) structures at room temperature for 2 hours after 20 min UV light irradiation.



Figure S2. STM image of *cis-trans* transformation for $2(4,4'-bpe)\cdot 2(iso-pa)$ structure after keeping at room temperature for 2 hours after 20 min UV light irradiation, the trans- $2(4,4'-bpe)\cdot 2(iso-pa)$ was indicated by the red circles. I_{set} = 299.1 pA; V_{bis} = 699.8 mV.

3、UV-vis spectra of 4,4'-bpe, iso-pa and TCDB



Figure S3. UV-visadsorption spectra of 4,4'-bpe (c = 1.0×10^{-6} M, blue),iso-pa (c = 6.0×10^{-6} M, red) and TCDB (c = 4.0×10^{-6} M, black) in ethanol.

4、STM image of 4,4'-bpe/iso-pa after irradiation for 60 min



Figure S4. STM image of 4,4'-bpe/iso-pa after irradiation for 60 min. I_{set} = 369pA; V_{bis} = 630 mV.4,4'-bpe molecules undergo [2+2] photodimerization as indicated by the white circles.



Figure S5. ATR-FTIR spectraof 4,4'-bpe/iso-pa in the range of 500-4050⁻¹on the HOPG surface before irradiation (black) and after UV light irradiation for 30 min (red).