Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Self-Assembled Organic Hexagonal Micro-prisms With High Second Harmonic Generation Efficiency For Multifunctional Photonic Devices

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Experimental Section

1. Materials

The compound of 3-methyl-4-methoxy-4′-nitrostilbene (MMONS) was synthesized according to literatures. The solvents of tetrahydrofuran (THF, HPLC grade) and methanol (HPLC grade) were purchased from Beijing Chemical Agent Ltd., China. Ultrapure water with a resistivity of 18.2 MΩ·cm-1, produced by using a Milli-Q apparatus (Millipore), were used in all experiments.

2. Preparation of organic micro-prisms.

In brief, a stock solution of MMONS (12.5mM) in tetrahydrofuran (THF) was pre-prepared. Then 50μL of this solution was rapidly injected into 1.0mL mixture of deionized water and methanol (volume ratio, v: v = 2:3) at room temperature under shaking. After aging at room temperature for 3 h, large amount of MMONS HMPs were obtained. Finally, precipitate was centrifugally separated from the colloidal suspension and washed twice using water prior to vacuum drying.

3. Structural characterization of MMONS HMPs.

The morphologies and sizes of the sample were examined using field emission scanning electron microscopy (FESEM, Hitachi S-4300) at acceleration voltages of 10-15 kV. Prior to analysis, the samples were coated with a thin platinum layer using an Edwards Sputter Coater. TEM images were obtained by a JEOL JEM-1011 transmission electron microscopy (TEM). One drop of the as-prepared colloidal dispersion was deposited on a carbon-coated copper grid, and dried under high vacuum. TEM measurement was performed at room temperature at an accelerating voltage of 100 kV.

Fluorescence images of DP micro-ribbons in Figure S5 were recorded using an Olympus research inverted system microscope (FV1000-IX81, Tokyo, Japan) equipped with a charge couple device (CCD, Olympus DP71, Tokyo, Japan) camera. The excitation source is a Xenon lamp equipped with a band-pass filter (330~380 nm for UV-light, 460-490 nm for blue plight). The samples were prepared by placing a drop of dispersion onto a cleaned quartz slide.

4. SHG measurement of MMONS HMPs.

MMONS HMPs was investigated at room temperature in air by a home-made optical microscopy equipped with a 50 × 0.9 NA excitation objective. The excitation laser pulses (800-1200 nm) for the SHG experiment were supplied by an optical parametric amplifier (OPA-

800CF, Spectra Physics), which was pumped by the output from a regenerative amplifier (Spitfire, Spectra Physics). The output laser pulse was then focused to a 1.5-μm-diameter spot to pump the selected individual HMP. The micro-area photoluminescence (μ-PL) images were recorded by using a CCD (DVC-1412AM high-resolution digital camera) in a reflective mode. Then μ-PL spectra were collected underneath by using another 50 × 0.9 NA objective that was mounted a 3D movable stage. Finally the collected μ-PL was coupled to an optical fiber and detected using a liquid-nitrogen-cooled CCD (SPEC-10:100BR, Roper Scientific) attached to a polychromator (Spectropro-550i, Acton). The spectral resolution is 0.1 nm. If necessary, we could record the spatially resolved PL spectra along the body of the selected MMONS HMP with a spatial resolution about 1 μm.

Figure S1

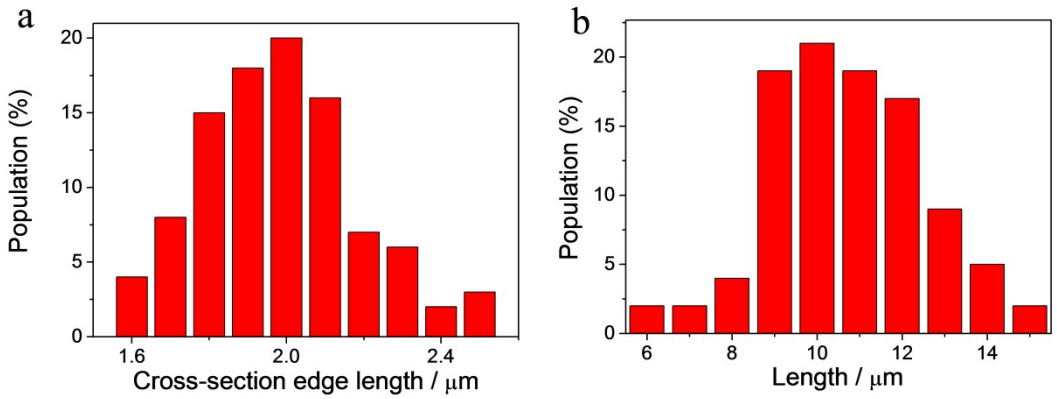

Figure S1. Typical size distribution accounted by 100 HMPs in once preparation.(a) Distribution of the edge length of hexagonal cross-section.(b) Distribution of length of HMPs along the axis orientation.

Figure S2

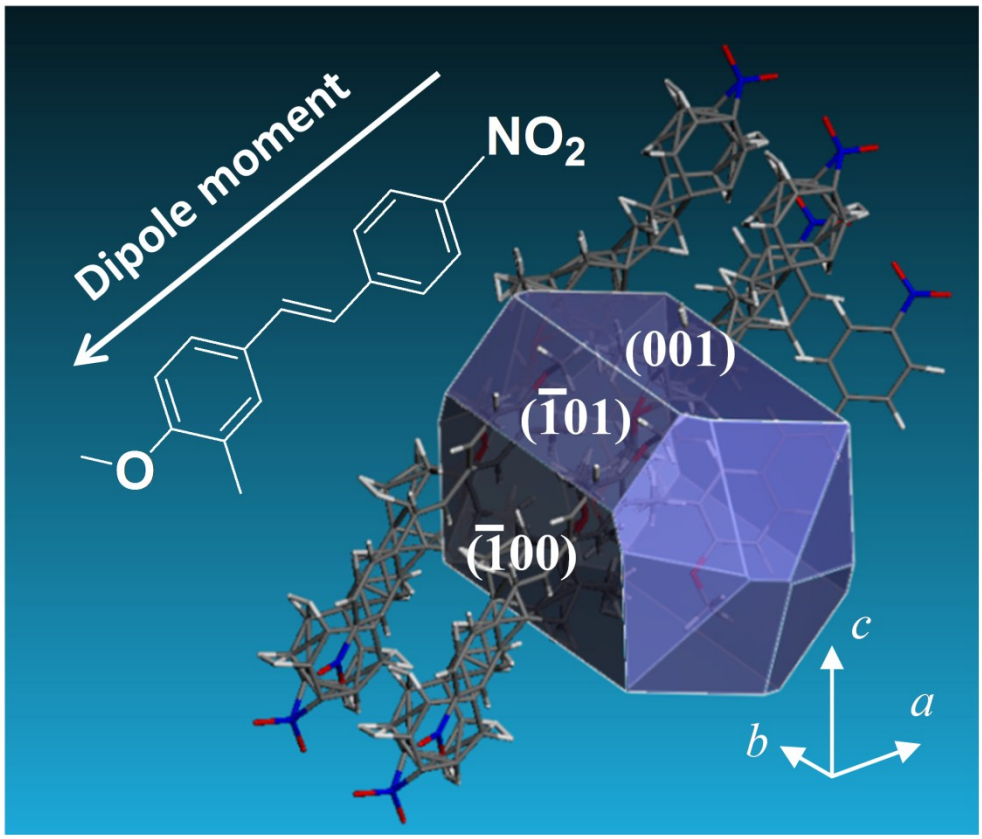

Figure S2. Theoretically predicted growth morphology of a single crystal of MMONS. Inset: molecular structure and dipole moment orientation of MMONS.

Figure S3

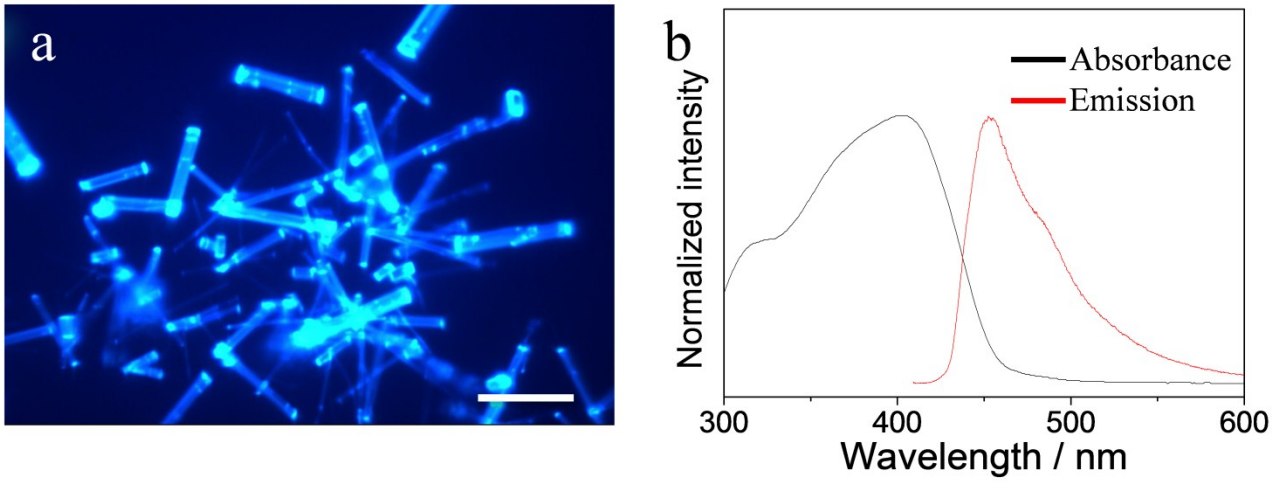

Figure S3. (a) Photoluminescence (PL) microscopy image of ensemble DP micro-ribbions on a quartz substrate excited with un-focused UV light (330–380 nm). The scale bar is 20 μm. (b) UV–vis absorption (black) and photoluminescence (PL) (red) spectra of DP micro-ribbon.

Figure S4

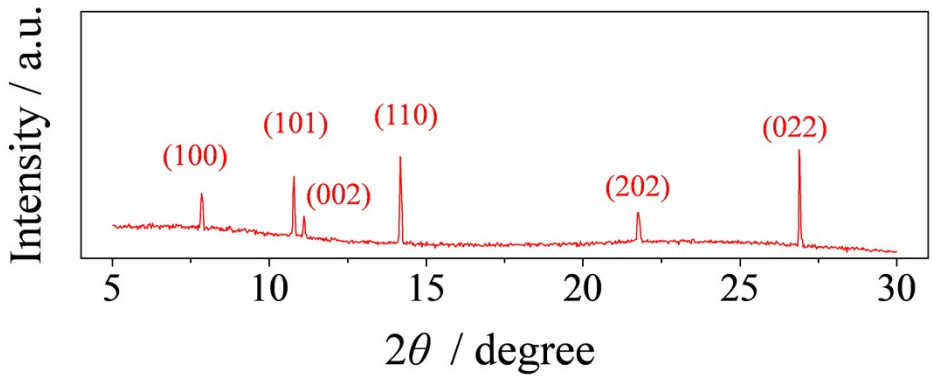

Figure S4. XRD patterns of assemblies of MMONS HMPs.