Supporting Information

Thickness-determined photocatalytic performance of bismuth tungstate nanosheets

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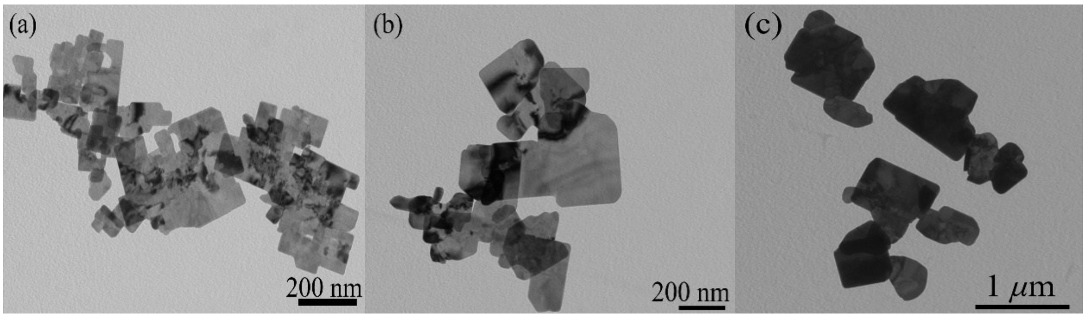


Fig. S1. TEM images of (a) W4, (b) W6 and (c) W8.

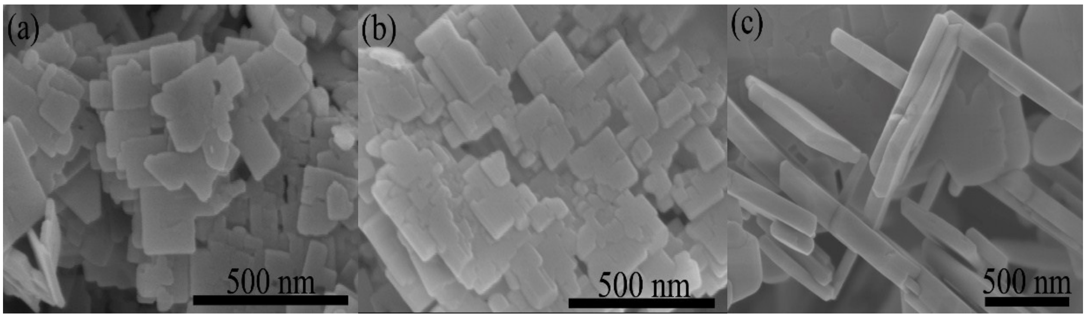


Fig. S2. SEM images of (a) W4, (b) W6 and (c) W8.

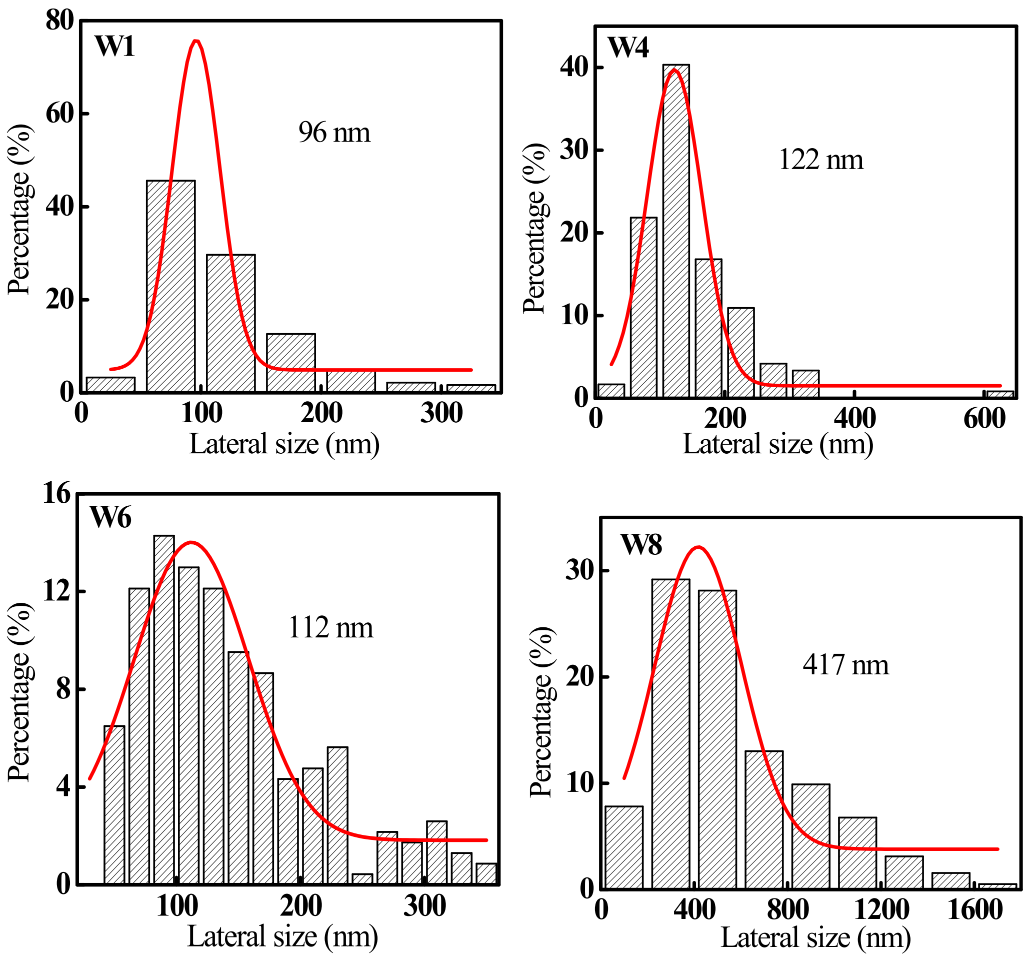


Fig. S3. Determination of lateral size (L) of the Bi_2WO_6 samples (W1, W4, W6, and W8) by statics of more than 100 pieces of nanosheets in the SEM image, respectively.

The solid lines were obtained by fitting the data to a Gaussian model and the numbers in the figure are the *L* values.

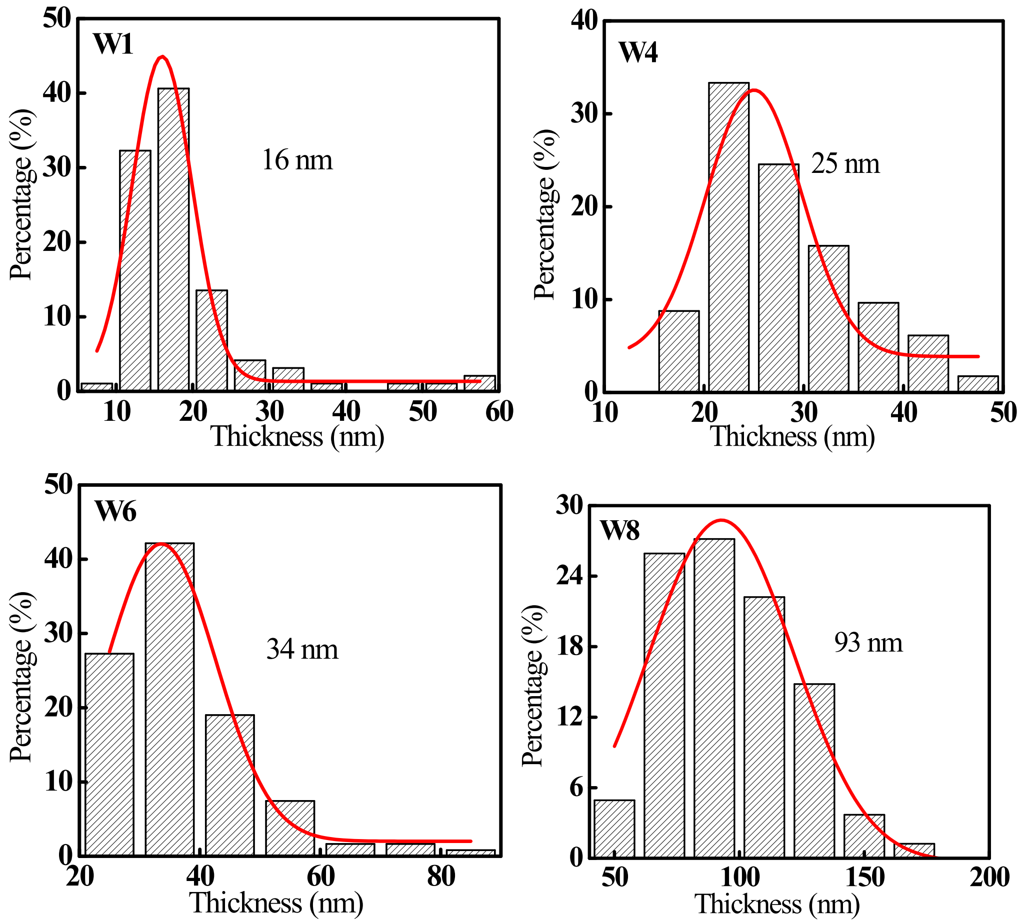


Fig. S4. Determination of average thickness (*H*) of the Bi_2WO_6 samples (W1, W4, W6, and W8) by statics of more than 100 pieces of nanosheets in the SEM images. The solid lines were obtained by fitting the data to a Gaussian model and the numbers in the figure are the *H* values.

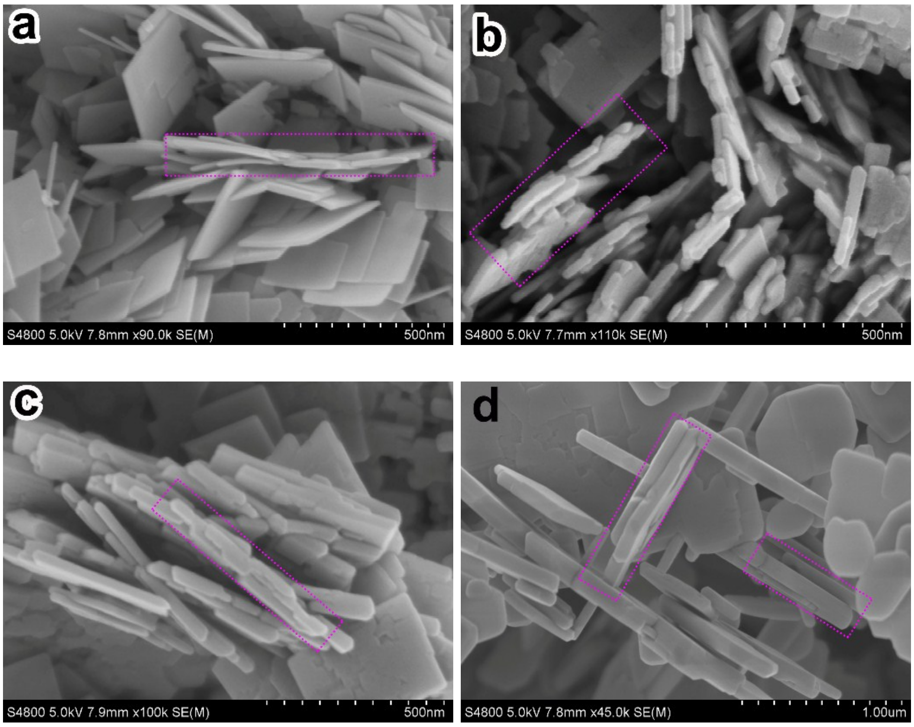


Fig. S5. SEM images of (a) W1, (b) W4, (c) W6, and (d) W8. The dotted lines show the stacked nanosheet structures.

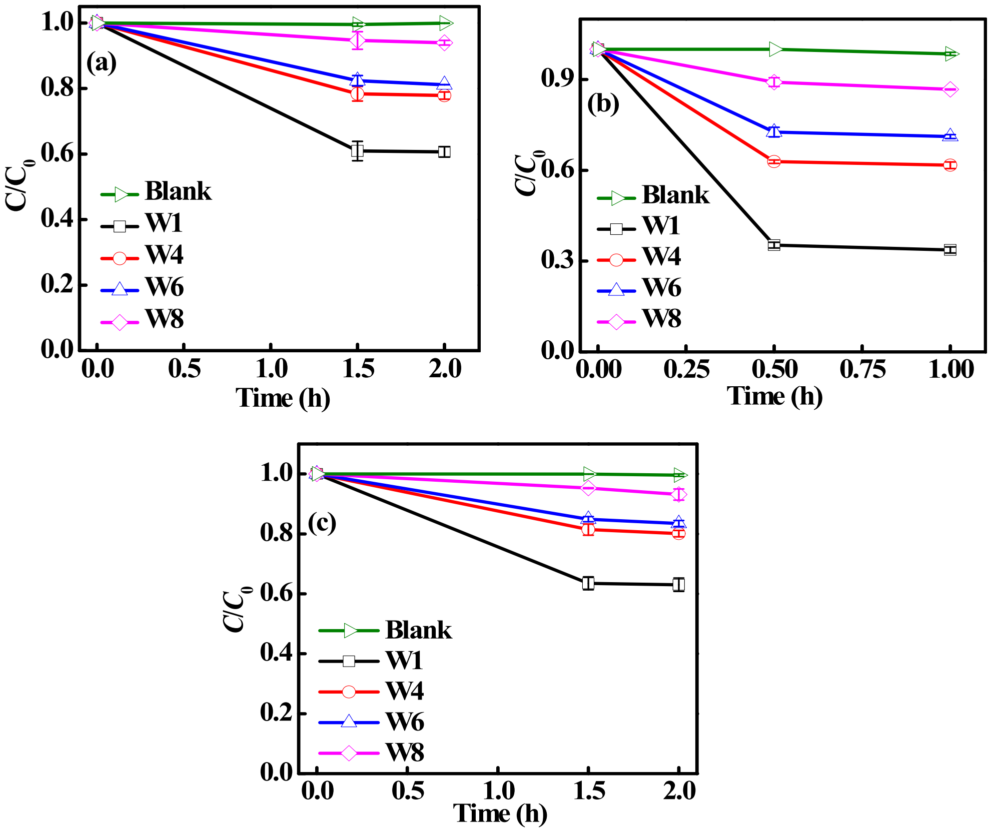


Fig. S6. Adsorptions of (a) RhB, (b) MB, and (c) EY on the Bi_2WO_6 samples.

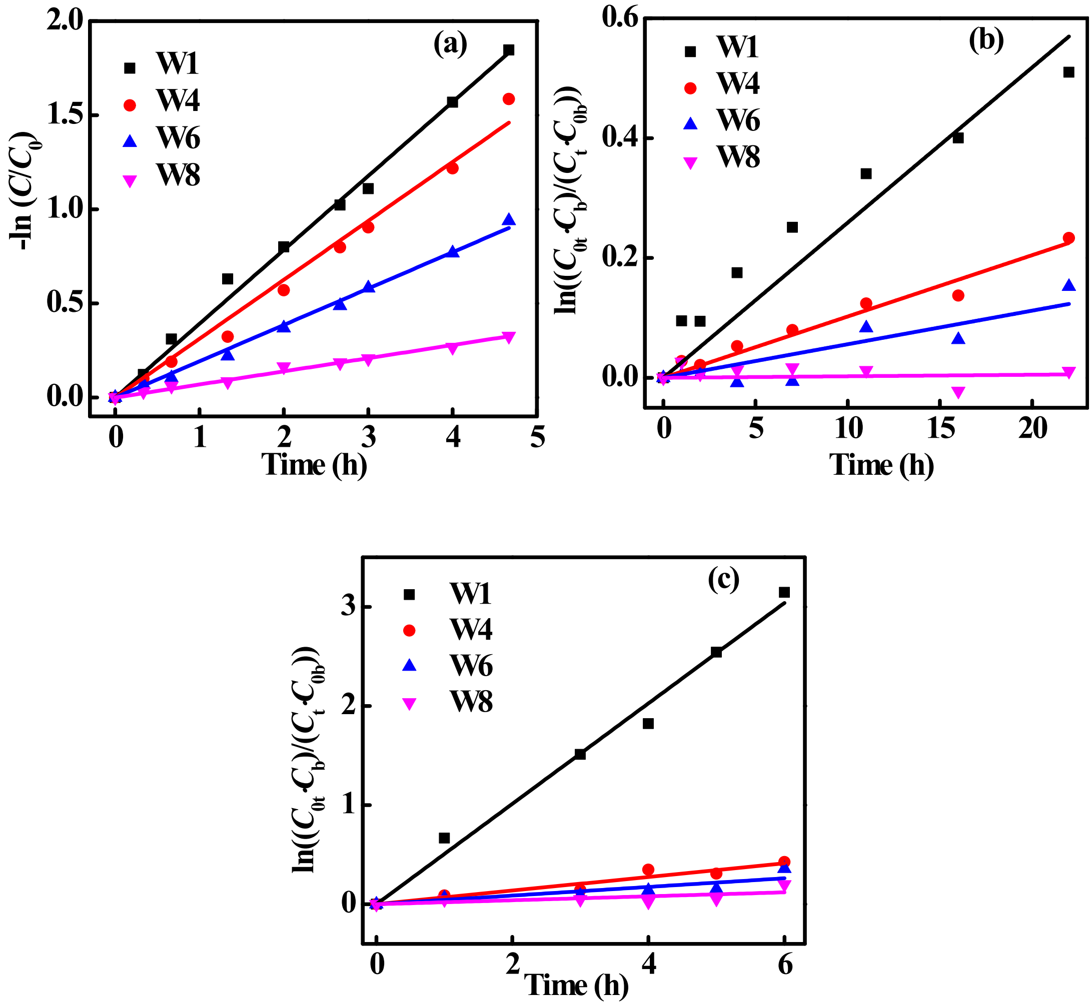


Fig. S7. Photodegradation data of (a) RhB, (b) MB, and (c) EY on Bi_2WO_6 nanosheets, fitted to a pseudo-first-order kinetic model.

Because self-degradations of the MB and EY are prominent (Fig. 6b, c), their influences can't be neglected. Provided that effects of nanoparticles and dye concentration differences between pure dye solutions and W1−W8 dye suspensions on the self-degradation of dyes are negligible, we can obtained:

$$-\ln(C_t/C_{0t}) = k_t t \qquad (1)$$

and

$$-\ln(C_b/C_{0b}) = k_b t \quad (2)$$

where C_t, C_{0t} and k_t are the dye concentration at any time, the initial dye concentration and the pseudo-first-order kinetic rate constant for W1−W8 suspensions, and C_b, C_{0b} and k_b are those for pure dye solution.

In association of Equation (1) and (2), the rate constant (k) excluding the influence of the self-degradations of dyes can be gained:

$$kt = (k_t - k_b)t = \ln((C_{0t} \cdot C_b)/(C_t \cdot C_{0b})) \quad (3).$$

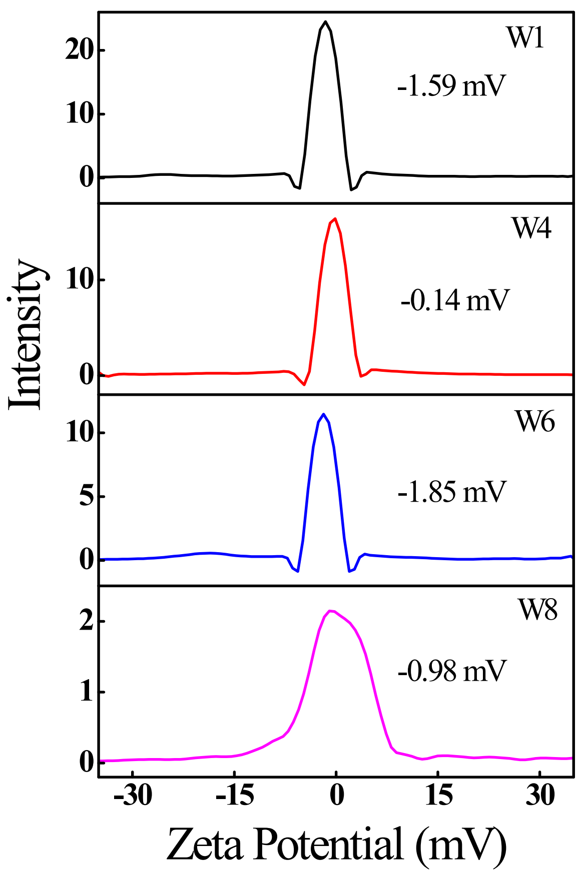


Fig. S8. Zeta potentials of W1 to W8.

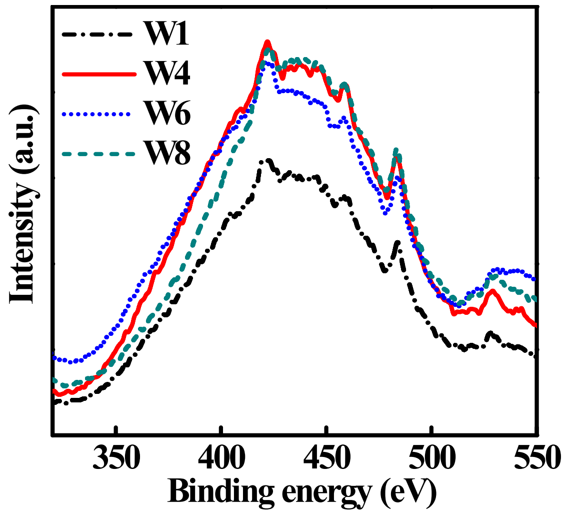


Fig. S9. PL spectra of Bi_2WO_6 samples with excitation wavelength of 300 nm.

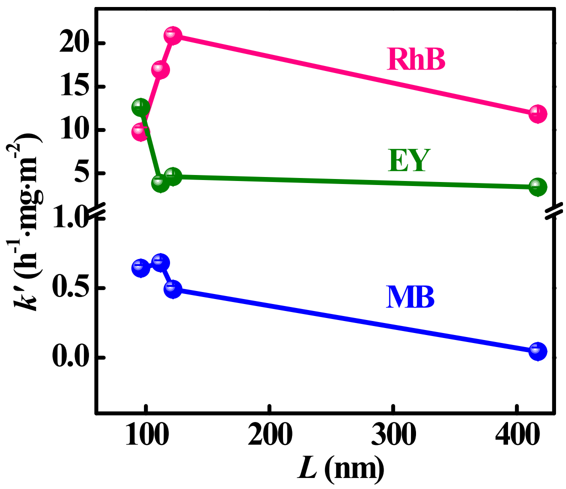


Fig. S10. Variations of specific surface are (S_{BET})-normalized pseudo-first-order rate constant (*k'*) with lateral size of nanosheets (*L*).

S1. Relationship between nanosheet thickness and specific surface area

Assuming that the nanoparticles were completely dispersed nanosheets and the top and bottom surfaces of the nanosheets are the same regular polygon with n ($n \geq 4$) sides and side length of a, we can get

$$m = \rho Hs = \rho Hna^2/[4\tan(\pi/n)] \qquad (4)$$

where m, ρ, H, s is the mass, the density, the thickness and the area of top or bottom surface of a nanosheet (which can be divided into the same n triangles), respectively, and

$$S = naH + 2s = na\{H + a/[2\tan(\pi/n)]\} \qquad (5)$$

where S is the surface area of a nanosheet.

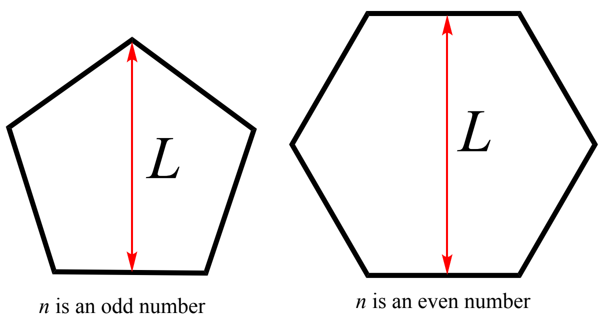
In association of Equation (4) and (5), the specific surface area (S') can be figured out:

$$S' = S/m = 2/\rho(1/H + 2/L) \quad (n \text{ is an even number}) \qquad (6)$$

or

$$S' = 2/\rho\{1/H + [1{+}1/\cos(\pi/n)]/L\} \quad (n \text{ is an odd number})$$
$$\approx 2/\rho(1/H + 2/L) \qquad (7)$$

where L is the lateral size of a nanosheet, as shown in Scheme 1.



Scheme 1 Schematic illustrations of lateral size (L) of a regular n-side polygon when n is an even and an odd number, respectively.

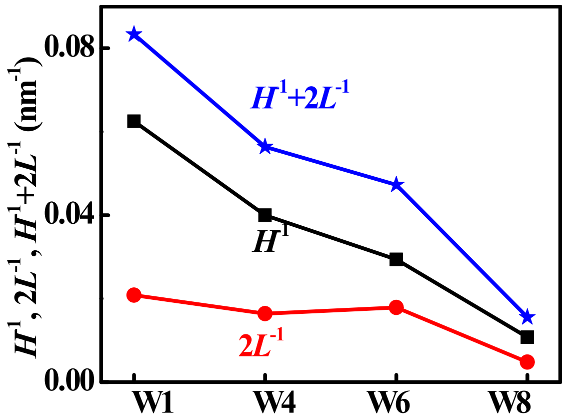


Fig. S11. Changes of H^{-1}, $2L^{-1}$ and $H^{-1}+2L^{-1}$ from W1 to W8.