

**Table S1.** The weight and size of the milling ball and milling time used in each experiment for optimization of ball size.

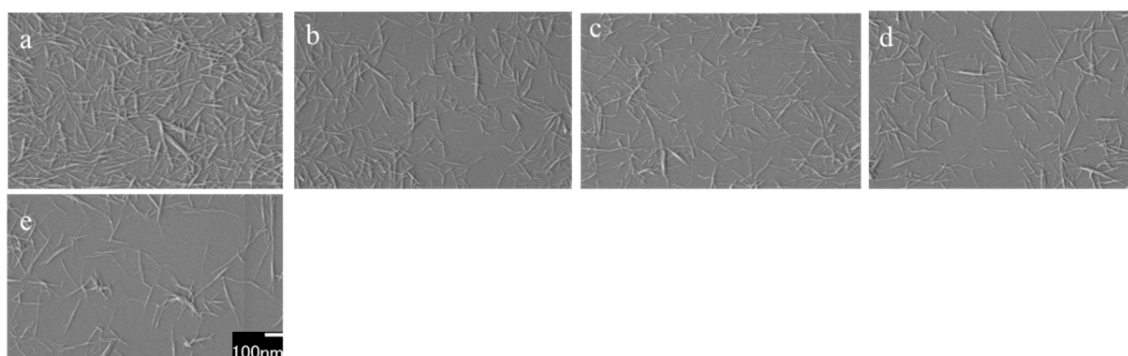
Experiment No.	Ball weight (g)	Milling time (min)	Ball size (mm)
1	120	120	0.3
2	120	120	1
3	120	120	5
4	120	120	10
5	120	120	20

**Table S2.** The weight and size of the milling ball and milling time used in each experiment for optimization of total ball weight.

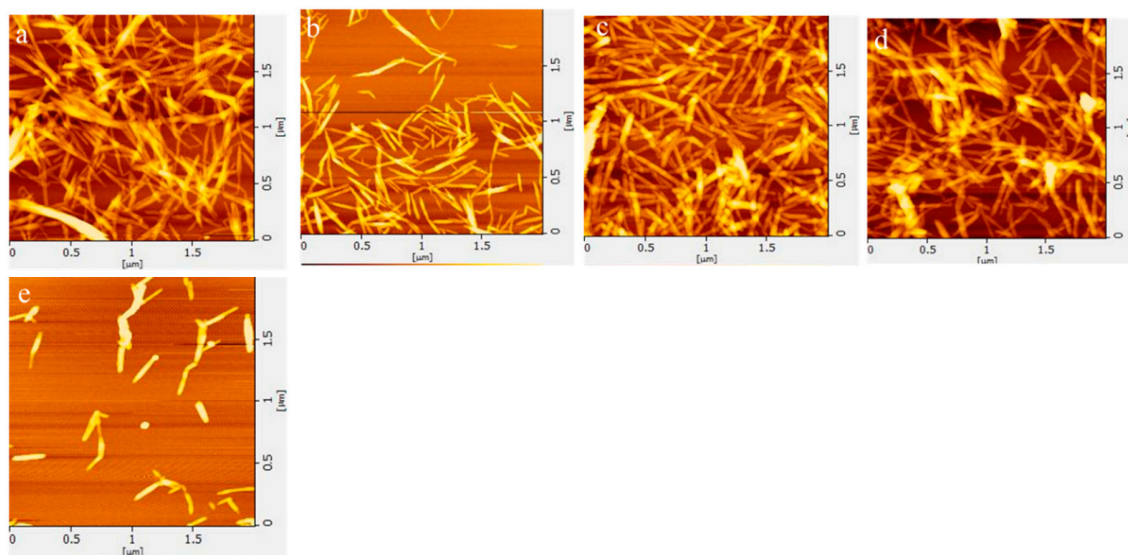
Experiment No.	Ball weight (g)	Milling time (min)	Ball size (mm)
1	20	120	1
2	60	120	1
3	120	120	1
4	300	120	1
5	600	120	1

**Table S3.** The weight and size of the milling ball and milling time used in each experiment for optimization of milling time.

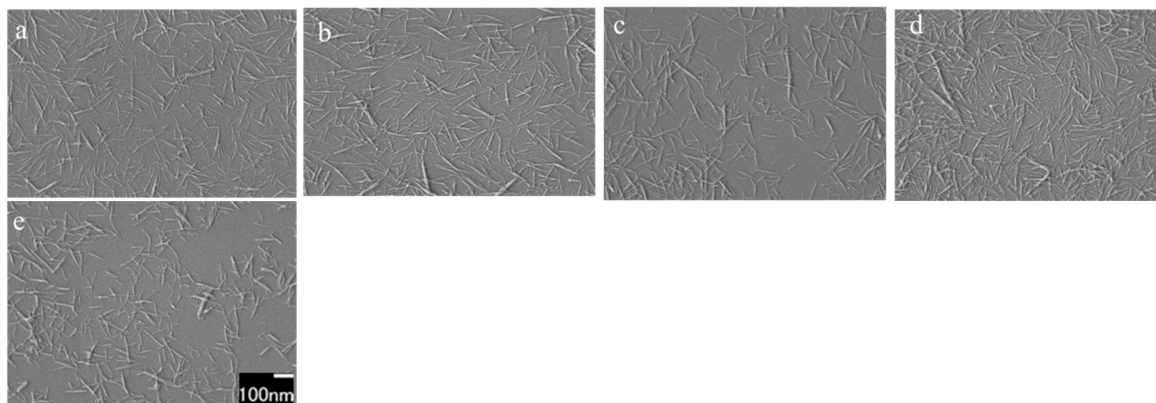
Experiment No.	Ball weight (g)	Milling time (min)	Ball size (mm)
1	300	30	1
2	300	60	1
3	300	90	1
4	300	120	1
5	300	150	1
6	300	180	1
7	300	240	1
8	300	300	1



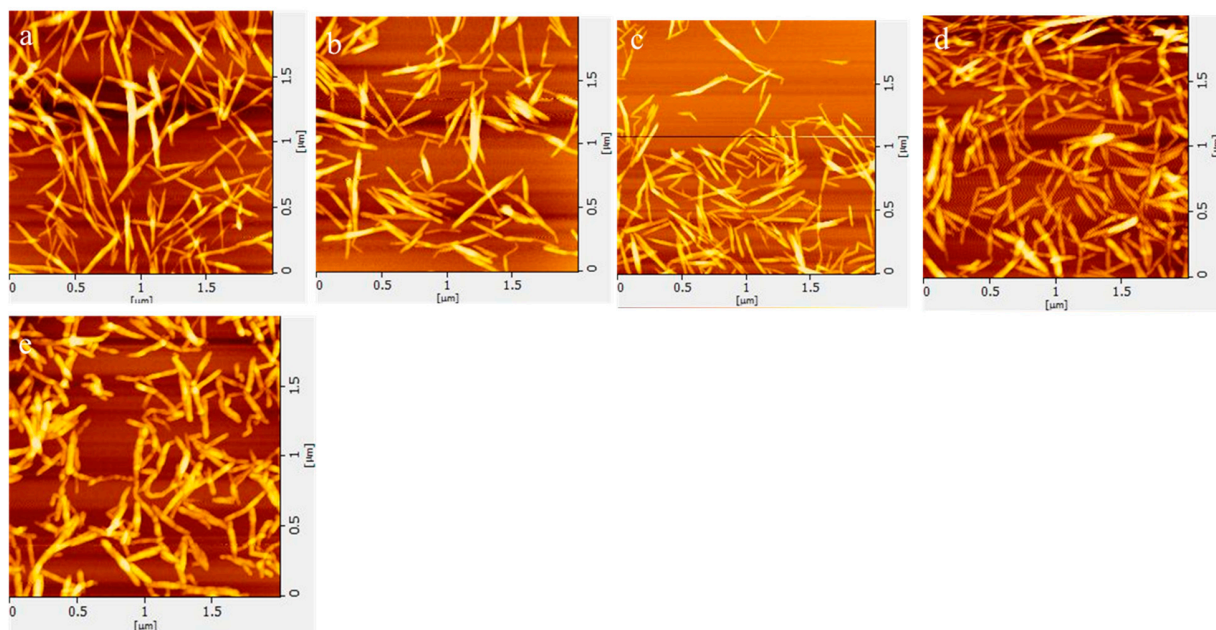
**Figure S1.** FE-SEM image of chitin nanofiber milled at a ball size of (a) 0.3, (b) 1, (c) 5, (d) 10, and (e) 20 mm.



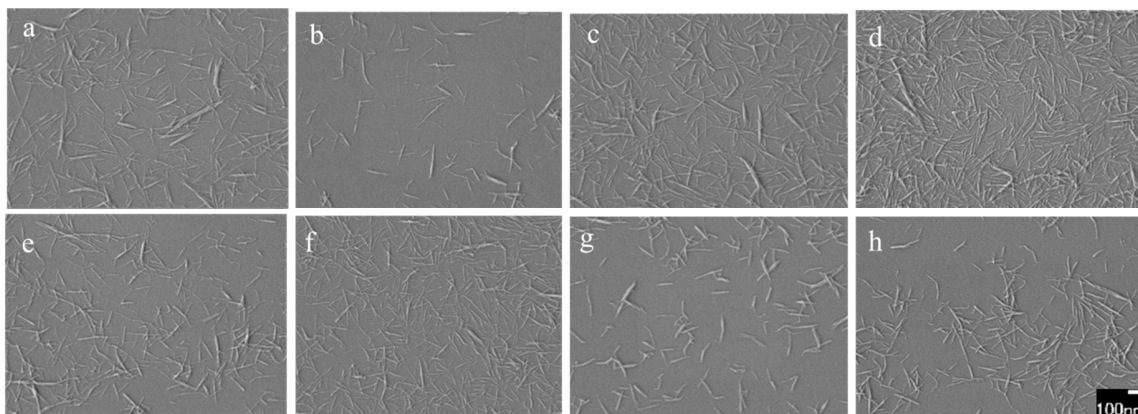
**Figure S2.** AFM image of chitin nanofiber milled at a ball size of (a) 0.3, (b) 1, (c) 5, (d) 10, and (e) 20 mm.



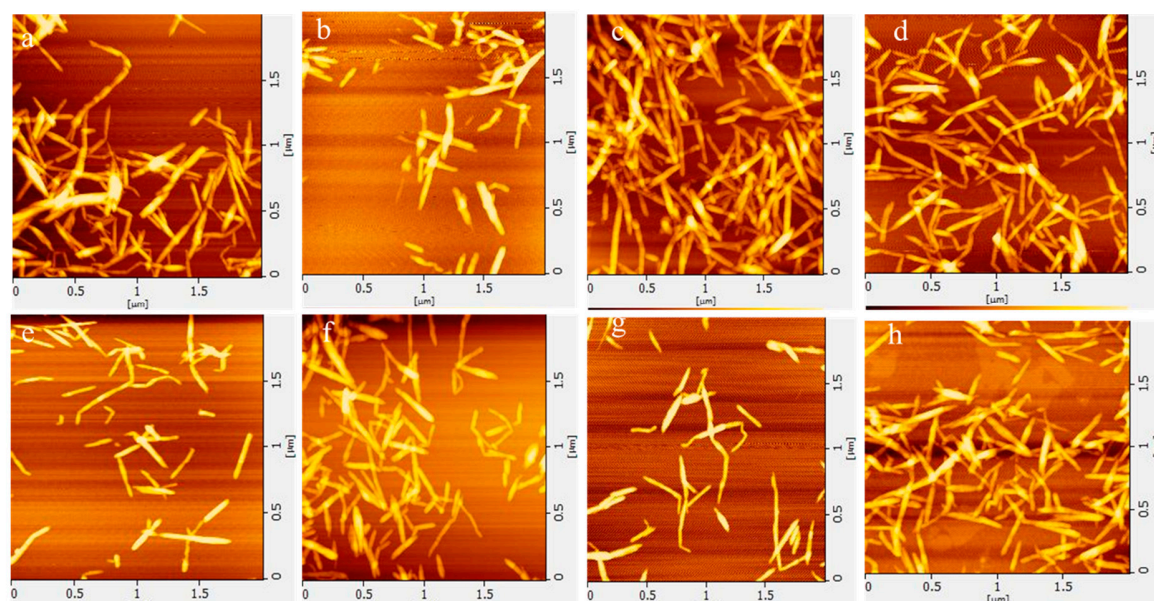
**Figure S3.** FE-SEM image of chitin nanofiber milled at a ball weight of (a) 20, (b) 60, (c) 120, (d) 300, and (e) 600 g.



**Figure S4.** AFM image of chitin nanofiber milled at a ball weight of (a) 20, (b) 60, (c) 120, (d) 300, and (e) 600 g.



**Figure S5.** FE-SEM image of chitin nanofiber after milling for (a) 30, (b) 60, (c) 90, (d) 120, (e) 150, (f) 180 (g) 240, and (h) 300 min.



**Figure S6.** AFM image of chitin nanofiber after milling for (a) 30, (b) 60, (c) 90, (d) 120, (e) 150, (f) 180 (g) 240, and (h) 300 min.