

*Supplementary Material*

## **Development of blended biopolymer-based photocatalytic hydrogel beads for adsorption and photodegradation of dyes**

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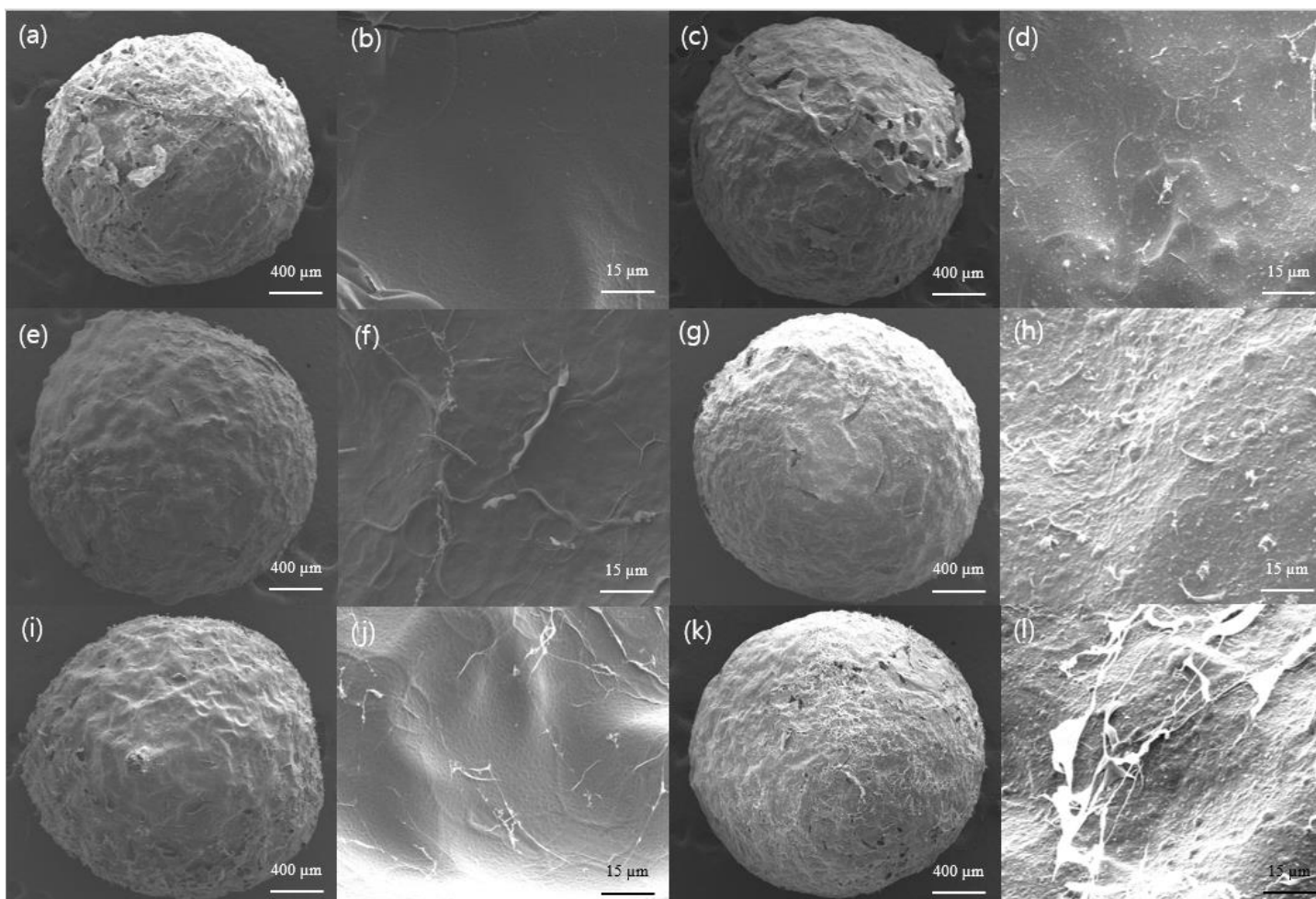


Figure S1. SEM images of freeze-dried biopolymers/TiO<sub>2</sub> beads. (a, b): cellulose; (c, d): cellulose/TiO<sub>2</sub>; (e, f): cellulose/chitosan; (g, h): cellulose/chitosan/TiO<sub>2</sub>; (i, j): cellulose/carrageenan; (k, l): cellulose/carrageenan/TiO<sub>2</sub>.

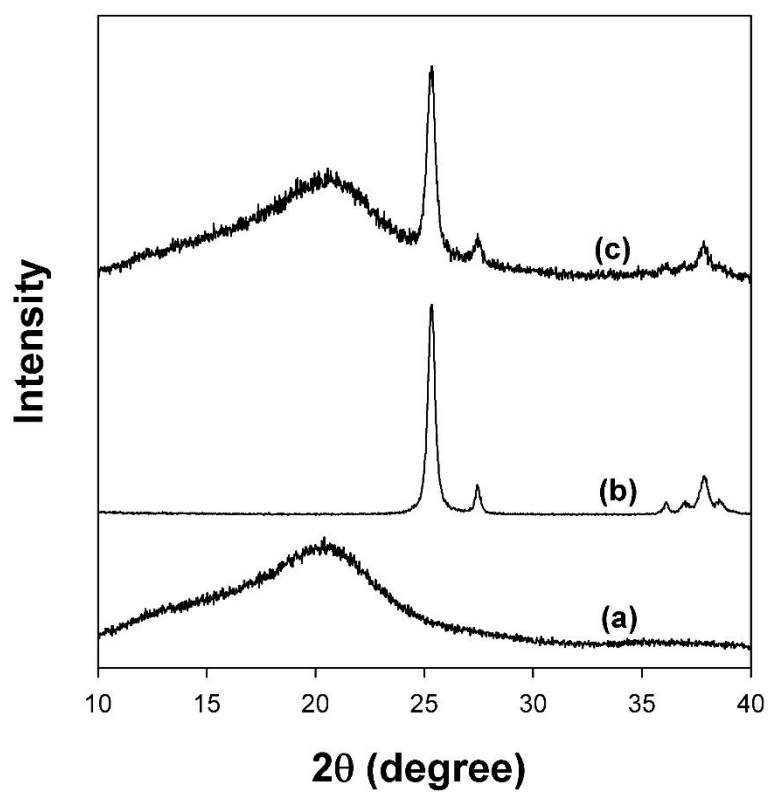


Figure S2. X-ray diffraction patterns of (a) cellulose beads, (b)  $\text{TiO}_2$ , and (c) cellulose/ $\text{TiO}_2$  beads. The contents of cellulose and  $\text{TiO}_2$  in the hydrogel beads forming solutions were 7% (w/v) and 0.5% (w/v), respectively.

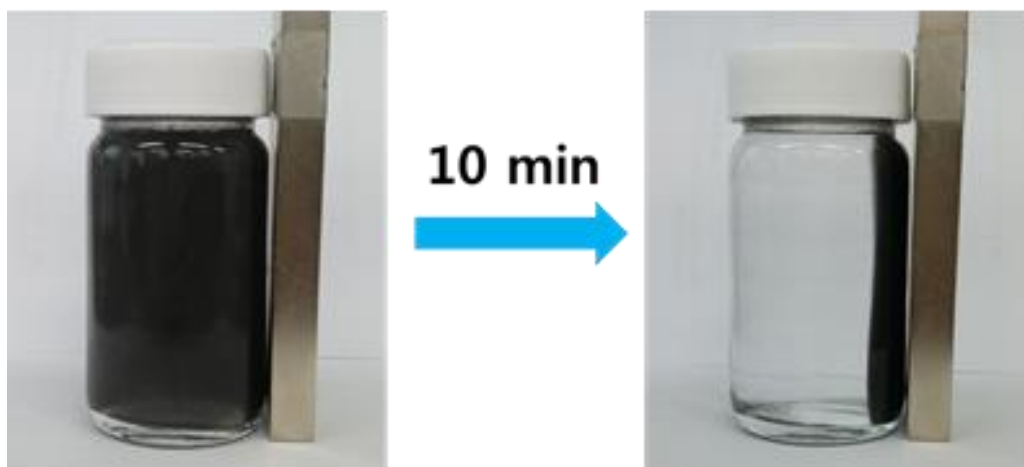


Figure S3. Recovery of cellulose/TiO<sub>2</sub>/Fe<sub>2</sub>O<sub>3</sub> hydrogel microbeads using a neodymium magnet.

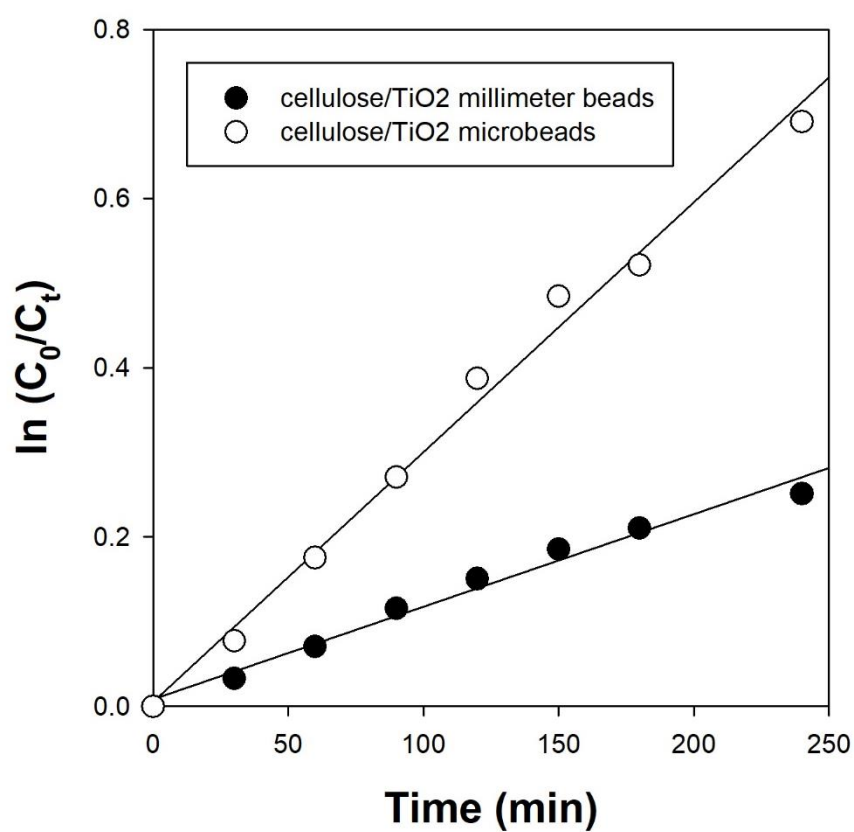


Figure S4. Plotting of “ $\ln (C_0/C_t)$  vs.  $t$ ” to determine the photodegradation activity of cellulose/TiO<sub>2</sub> millimeter-sized hydrogel beads (●) and cellulose/TiO<sub>2</sub> hydrogel microbeads (○).