Supporting Information

for

Nanocasting synthesis of BiFeO$_3$ nanoparticles with enhanced visible-light photocatalytic activity

Thomas Cadenbach, Maria J. Benitez, A. Lucia Morales, Cesar Costa Vera, Luis Lascano, Francisco Quiroz, Alexis Debut and Karla Vizuete

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Additional figures and tables
Table S1: Calcination paths.

| Path      | Reaction regarding: | Reaction regarding |
|-----------|----------------------|---------------------|
|           | complexing agents, solvents, molar ratio-0 | molar ratio-1 |
| Initial temperature (°C) | 22 | - |
| Heat rate 1 (°C/min) | 1 | - |
| Plateau 1 (°C) | 200 | - |
| Drying Time 1 (h) | 2 | - |
| Heat rate 2 (°C/min) | 1 | - |
| Plateau 2 (°C) | 250 | - |
| Drying Time 2 (h) | 2 | - |
| Heat rate 3 (°C/min) | 4 | 4 |
| Final Temperature (°C) | 500 | 500 |
| Final Calcination Time (h) | 1 | 1 |
**Figure S1**: UV–vis spectra of Rhodamine B in dependence of irradiation time in the presence of 5.5 nm BiFeO$_3$ NP.

\[
\text{BiFeO}_3 + h\nu \rightarrow e^{-} + h^{+}
\]
\[
h^{+} + \text{H}_2\text{O} \rightarrow \cdot\text{OH}
\]
\[
h^{+} + \text{RhB} \rightarrow \text{degradation products}
\]
\[
\cdot\text{OH} + \text{RhB} \rightarrow \text{degradation products}
\]
\[
\cdot\text{O}^2^{-} + \text{RhB} \rightarrow \text{degradation products}
\]

**Figure S2**: Photocatalytic mechanism of RhB degradation using 5.5 nm BiFeO$_3$ nanoparticles.
Figure S3: Small-angle XRD pattern of SBA-15.

Figure S4: Nitrogen adsorption isotherms of SBA-15.
Table S2: Summary of BET analysis of SBA-15.

| Pore Size                                        |                        |
|-------------------------------------------------|------------------------|
| Adsorption average pore diameter (4V/A by BET):  | 6.01773 nm             |
| Desorption average pore diameter (4V/A by BET):  | 6.05495 nm             |
| BJH Adsorption average pore diameter (4V/A):     | 6.2516 nm              |
| BJH Desorption average pore diameter (4V/A):     | 5.8164 nm              |
| D-H Adsorption average pore diameter (4V/A):     | 6.2643 nm              |
| D-H Desorption average pore diameter (4V/A):     | 5.8198 nm              |

| Surface Area                                     |                        |
|-------------------------------------------------|------------------------|
| Single point surface area at $P/P_0 = 0.300000000$ | 680.2137 m²/g          |
| BET Surface Area:                                | 699.0213 m²/g          |
| Langmuir Surface Area:                           | 3,573.7975 m²/g        |
| t-Plot Micropore Area:                           | 33.0353 m²/g           |
| t-Plot external surface area:                    | 665.9860 m²/g          |
| BJH Adsorption cumulative surface area of pores  |                        |
| between 1.7000 nm and 300.0000 nm diameter:      | 651.433 m²/g           |
| Description                                      | Value       |
|--------------------------------------------------|-------------|
| BJH Desorption cumulative surface area of pores |             |
| between 1.7000 nm and 300.0000 nm diameter:      | 716.5886 m²/g|
| D-H Adsorption cumulative surface area of pores  |             |
| between 1.7000 nm and 300.0000 nm diameter:      | 647.872 m²/g|
| D-H Desorption cumulative surface area of pores  |             |
| between 1.7000 nm and 300.0000 nm diameter:      | 714.5655 m²/g|

**Figure S5:** TEM image of SBA-15.
Figure S6: TEM image of BiFeO$_3$@SBA-15.

Figure S7: XRD pattern of 5.5 nm BiFeO$_3$ NP after 5 catalytic cycles.