

Supporting Information

Topochemical Conversion of Discontinuous-zone-axis to Form Bismuth Titanate Oriented Polycrystal Nanocomposites

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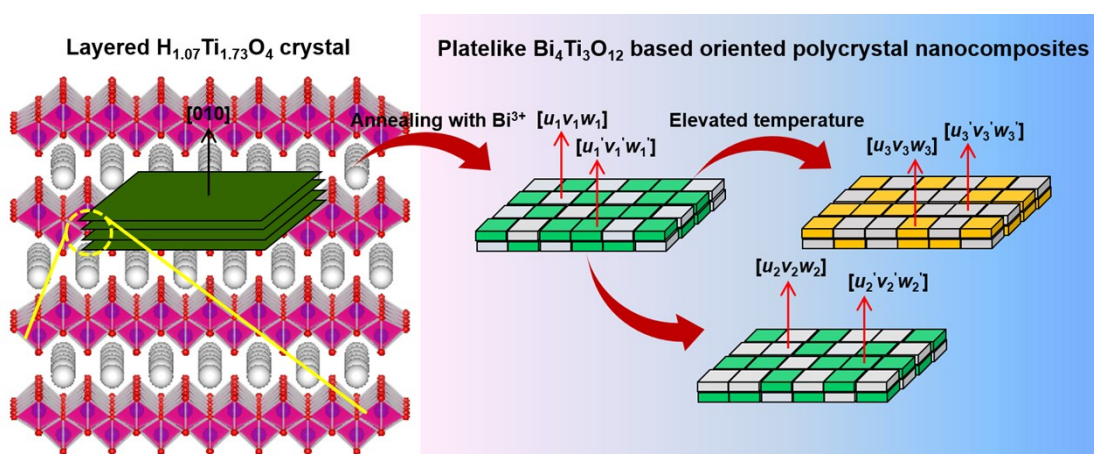
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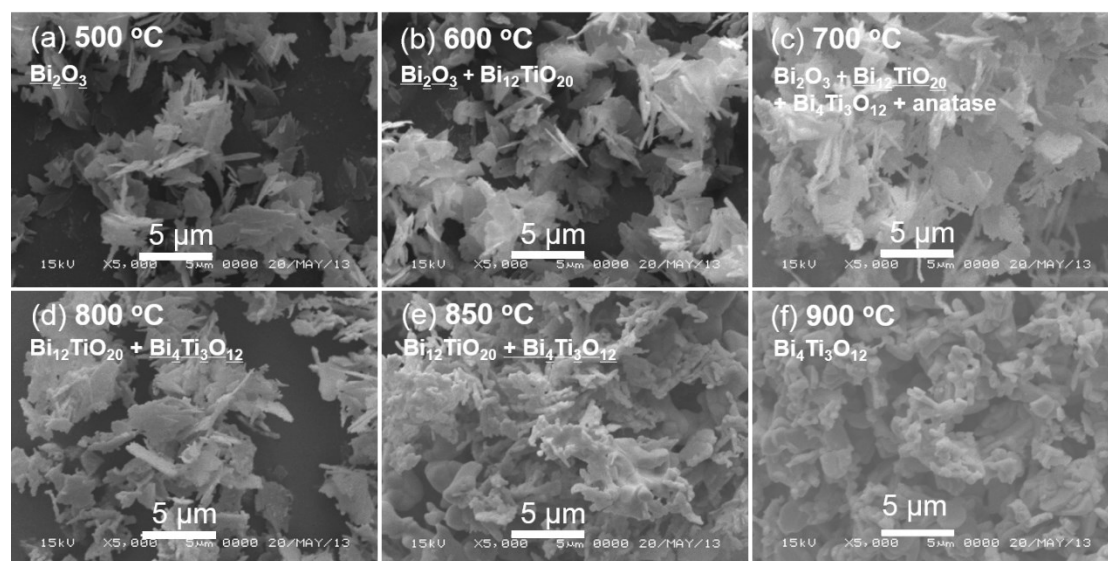


Figure S1. SEM images of samples obtained by annealing treatments of HTO-Bi₂O₃ mixed powders at (a) 500, (b) 600, (c) 700, (d) 800, (e) 850, and (f) 900 °C for 3 h, respectively.

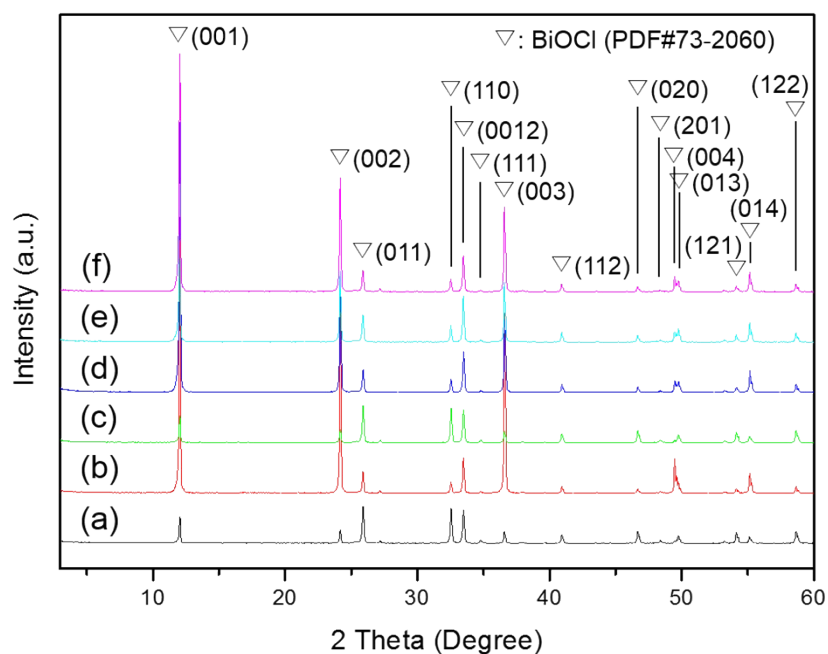


Figure S2. XRD patterns of samples obtained by solvothermal treatments of HTO-BiCl₃ mixed suspension in (a) ethanol, (b) ethanol-water (20-10, Vol-Vol), (c) ethanol-water (10-20), (d) aqueous solution, (e) acetic acid (0.5mol/L), and (f) acetic acid (0.5mol/L) – ethanol (10-20) different solutions at 200 °C for 12 h, respectively.

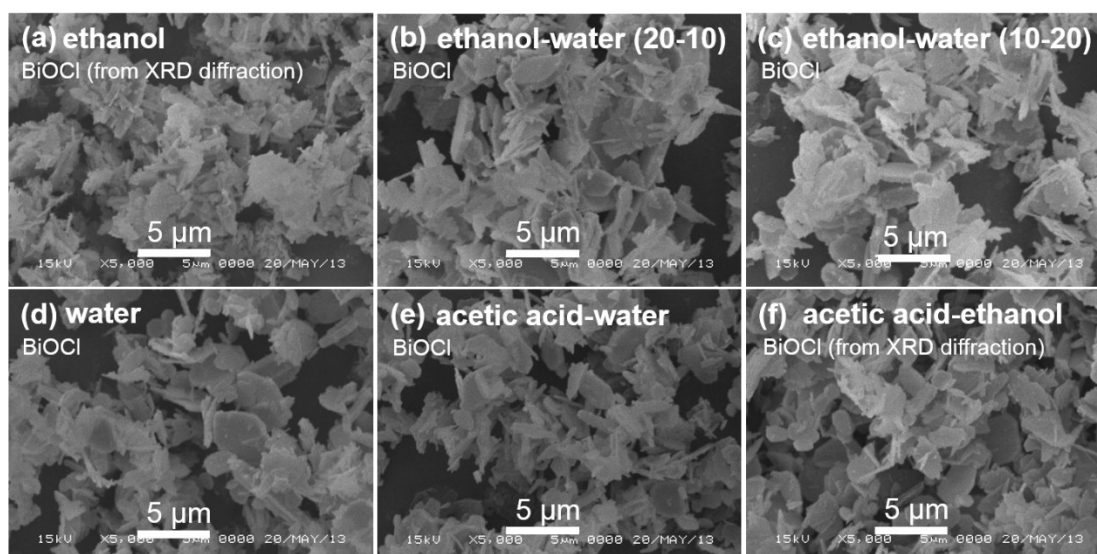


Figure S3. SEM images of samples obtained by solvothermal treatments of HTO-BiCl₃ mixed suspension in (a) ethanol, (b) ethanol-water (20-10, Vol-Vol), (c) ethanol-water (10-20), (d) aqueous solution, (e) acetic acid (0.5mol/L), and (f) acetic acid (0.5mol/L)–ethanol (10-20) different solutions at 200 °C for 12 h, respectively.

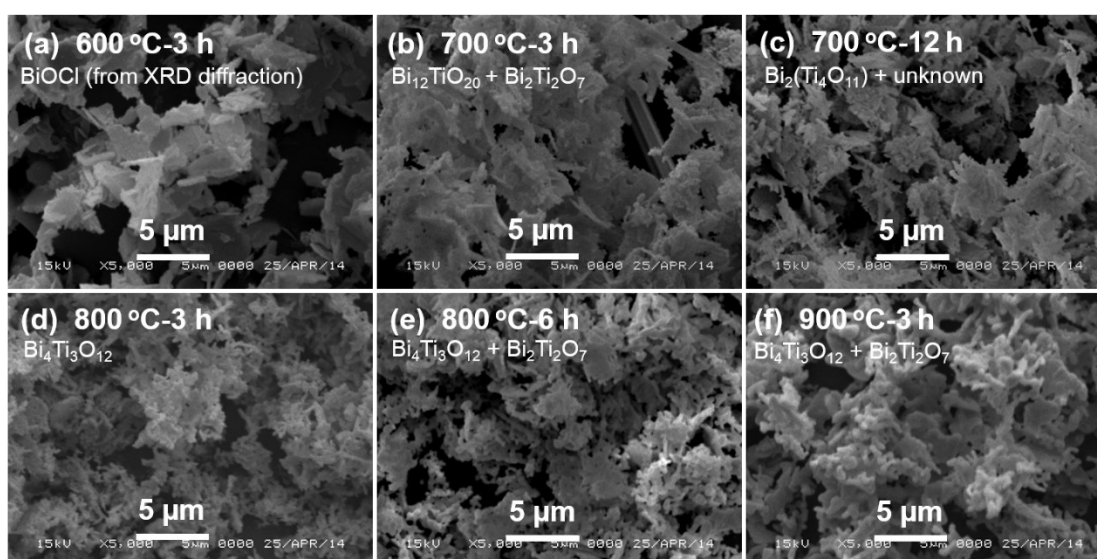


Figure S4. SEM images of samples obtained by annealing treatments of HTO-BiOCl nanocomposite crystals at 600 to 900 °C for 3 to 12 h, respectively. HTO-BiOCl nanocomposite crystals obtained by solvothermal treatment of HTO-BiCl₃ mixed suspension in aqueous solution at 200 °C for 12 h.

Table S1. Lattice mismatch rate of products in HTO-Bi₂O₃ and HTO-BiCl₃ reaction systems^a.

| | Reaction condition | Phase composite of products | Plane-11& Plane-21 ^b | <i>d</i> -11& <i>d</i> -21 ^c | Lattice mismatch rate between plane-11& plane-21 | Plane-12& Plane-22 | <i>d</i> -12& <i>d</i> -22 | Lattice mismatch rate between plane-12& plane-22 |
|------------------------------------|--------------------|---|---------------------------------|---|--|--------------------|----------------------------|--|
| HTO-Bi ₂ O ₃ | 600 °C-3 h | anatase/Bi ₁₂ TiO ₂₀ | (101)&(220) | 3.5171&3.5970 | -2% | (103)&(103) | 2.4309&3.2173 | - |
| | 700 °C-3 h | Bi ₁₂ TiO ₂₀ /Bi ₄ Ti ₃ O ₁₂ | (330)&(020) | 2.3980&2.7055 | -13% | (400)&(117) | 2.5435&2.9686 | -17% |
| | 800 °C-3 h | Bi ₁₂ TiO ₂₀ /Bi ₄ Ti ₃ O ₁₂ | (220)&(-111) | 3.5988&3.8132 | -6% | (-222)&(117) | 2.9370&2.9686 | -1% |
| | 850 °C-3 h | Bi ₁₂ TiO ₂₀ /Bi ₄ Ti ₃ O ₁₂ | (3-21)&(020) | 2.7191&2.7016 | 1% | (310)&(117) | 3.2124&2.9661 | -8% |
| HTO-BiCl ₃ | 600 °C-3 h | anatase/BiOCl | (004)&(003) | 2.3785&2.4490 | -3% | (006)&(005) | 1.5857&1.4694 | 7% |
| | 700 °C-3 h | Bi ₁₂ TiO ₂₀ /Bi ₂ Ti ₂ O ₇ | (333)&(666) | 1.9580&1.9899 | -2% | (1-10)&(2-20) | 7.1940&7.3115 | -2% |
| | 800 °C-6 h | Bi ₄ Ti ₃ O ₁₂ /Bi ₂ Ti ₂ O ₇ | (005)&(444) | 6.5660&2.9849 | - | (220)&(8-80) | 1.9196&1.8279 | 5% |

^a The crystal phases selected in this table are all derived from the SAED patterns of the samples. The error of the *d*-spacing is $\pm 8 \sim \pm 13$ of the last digit of the decimal point.

^b Plane-*xy* represents the no. *y* crystal Plane of the no. *x* phase in the phase composite of products.

^c *d*-*xy* represents the average *d*-spacing of the no. *y* crystal Plane for the no. *x* phase in the phase composite of products.