Supporting information

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3. Figure S3 Synchrotron diffraction patterns of β-$BaTi_2O_5$ phase and rietveld profile fitting

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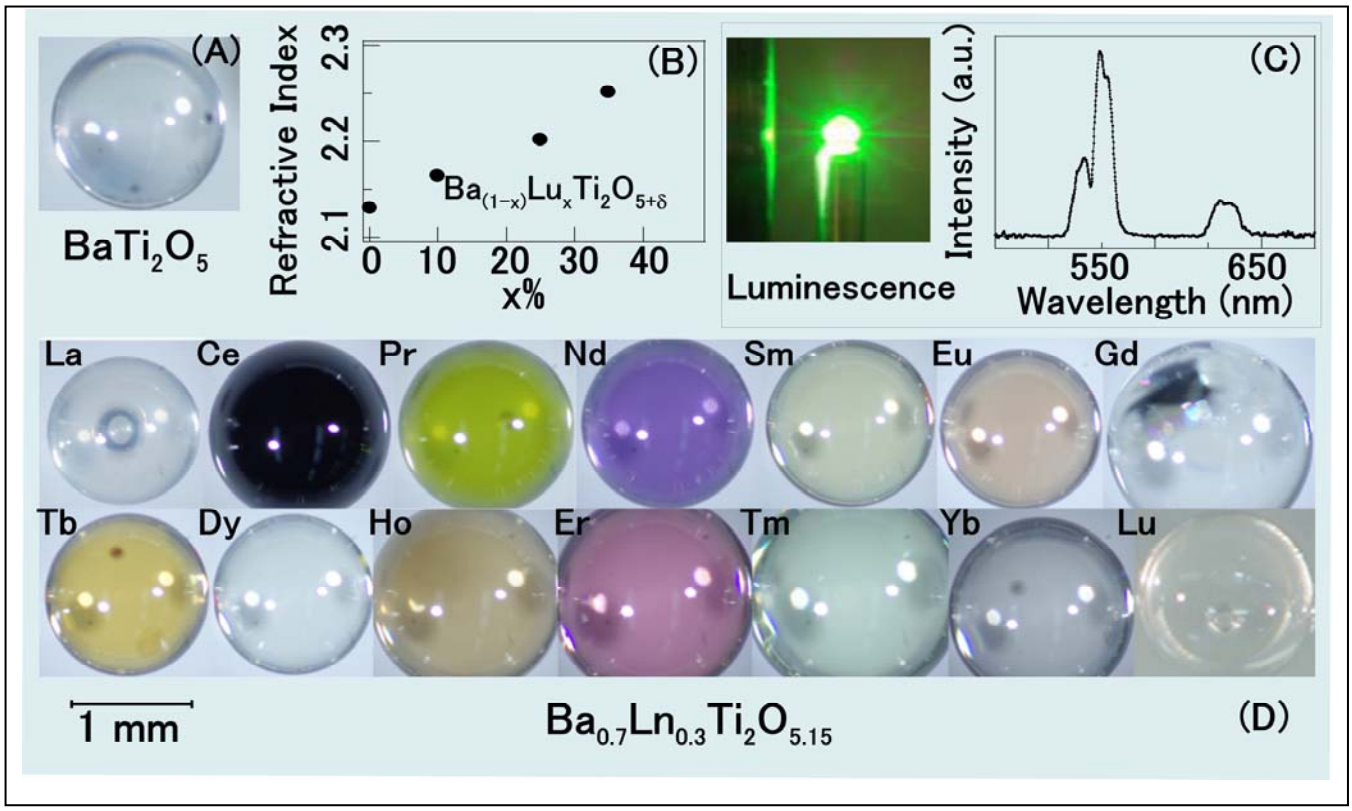

Figure S1 Ln-doped $BaTi_2O_5$ bulk spherical glasses. a, Photograph of $BaTi_2O_5$ glass. b, Refractive index of $Ba_{(1-x)}Lu_xTi_2O_{5+\delta}$, which increases linearly from 2.14 to 2.24 with increasing Lu. c, Optical photograph of luminescence and excitation spectrum of $Ba_{0.94}Er_{0.05}Y_{0.01}Ti_2O_{5+\delta}$ pumped by 980nm laser. d, Photograph of $Ba_{0.7}Ln_{0.3}Ti_2O_{5.15}$ glass.

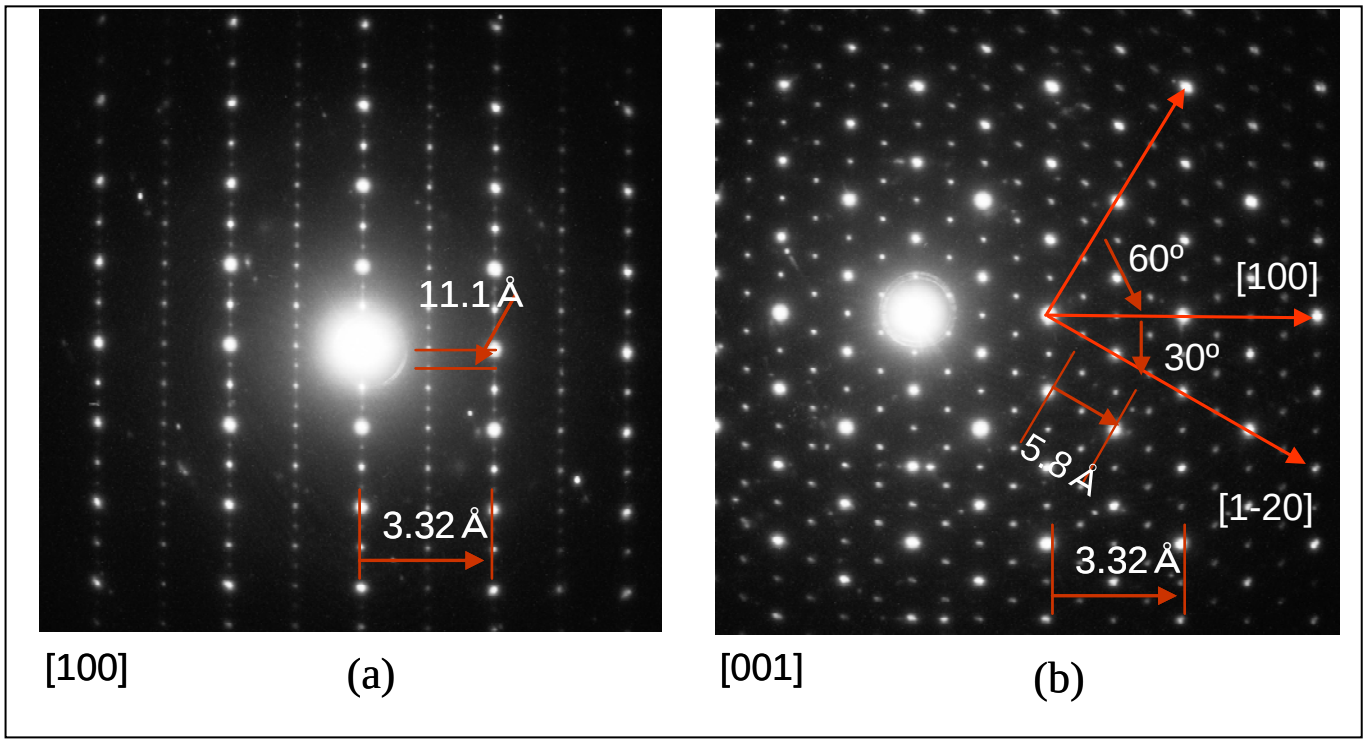

Figure S2 Electron diffraction pattern of α-$BaTi_2O_5$ phase; (a) in [100] direction and [b] in [001] direction. The lattice unit cell was assigned as hexagonal structure with a=6.6 Å and c=11.1 Å.

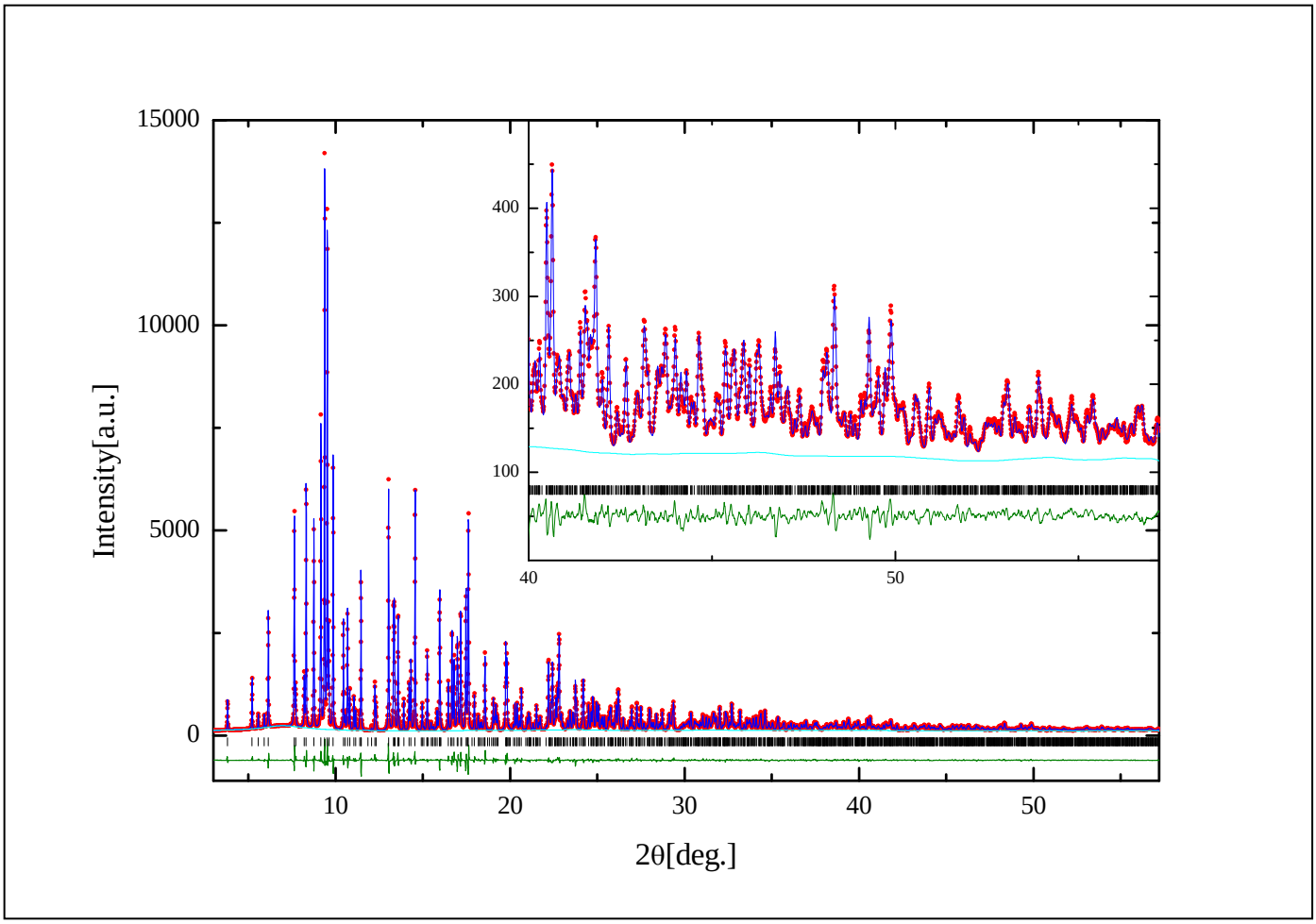

Figure S3 Synchrotron diffraction patterns of β-$BaTi_2O_5$ phase and rietveld profile fitting with R_{wp} = 4.43%, R_I = 2.25% and R_F = 1.61%

CIF data of β-$BaTi_2O_5$

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'1/2-x,1/2+y,1/2+z'

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  O       O2      0.1747    0.7500    0.4308
  O       O3      0.4897    0.2500    0.1487
  O       O4      0.2671    0.2500    0.2808
  O       O5      0.1986    0.2500    0.5831
  Ti     Ti1      0.2653    0.2500    0.1028
  Ti     Ti2      0.1474    0.2500    0.4079
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