

Enhanced Photoluminescence of Europium-Doped TiO₂ Nanoparticles using a Single-Source Precursor Strategy

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Supplementary Materials

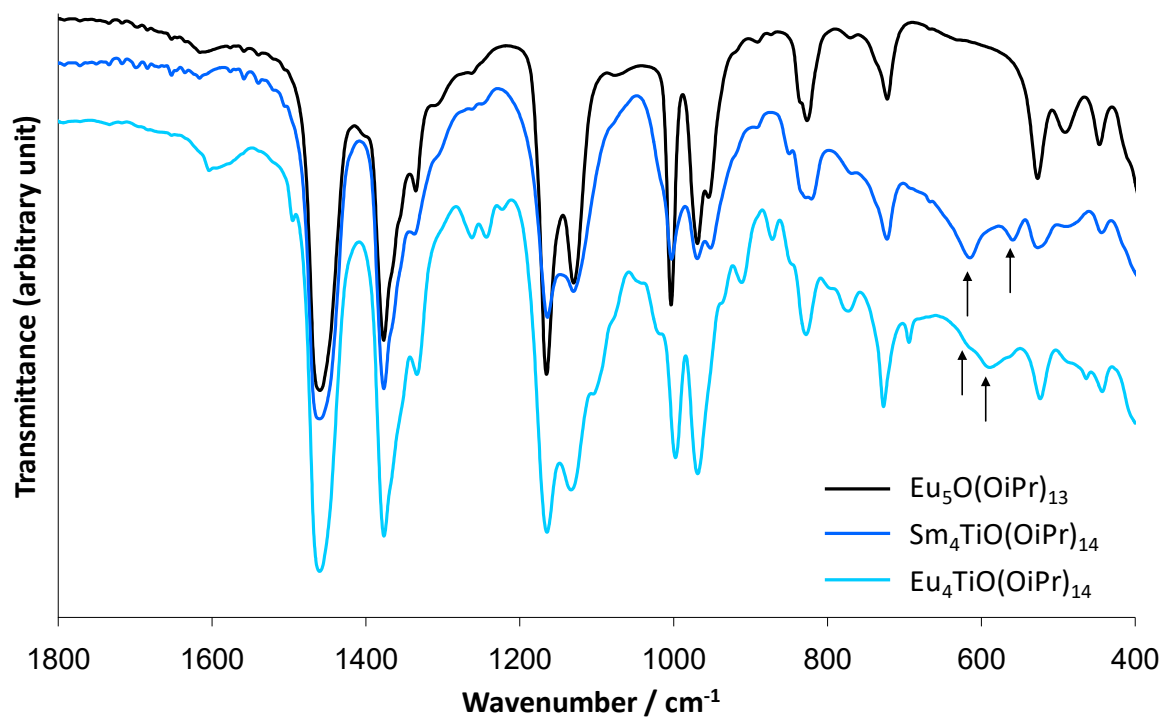


Figure S1. FT-IR spectra of Eu₄Ti(OiPr)₁₄ precursor compared to Sm₄Ti(OiPr)₁₄ and Eu₅O(OiPr)₁₃.

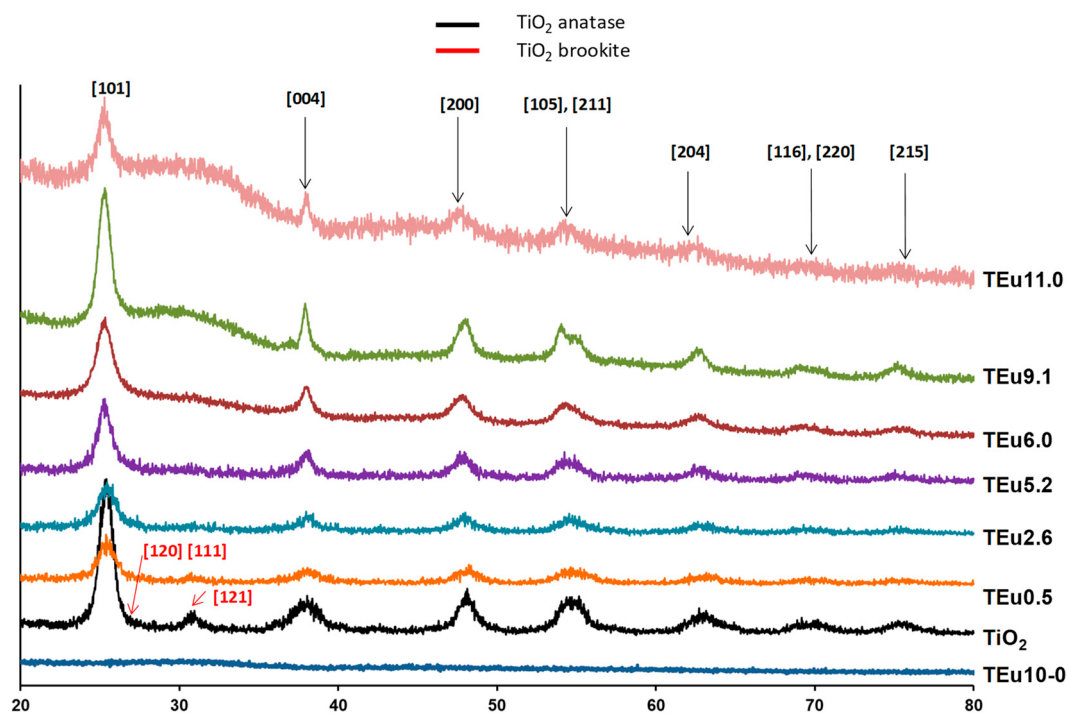


Figure S2. XRD patterns of as-prepared sol-gel samples.

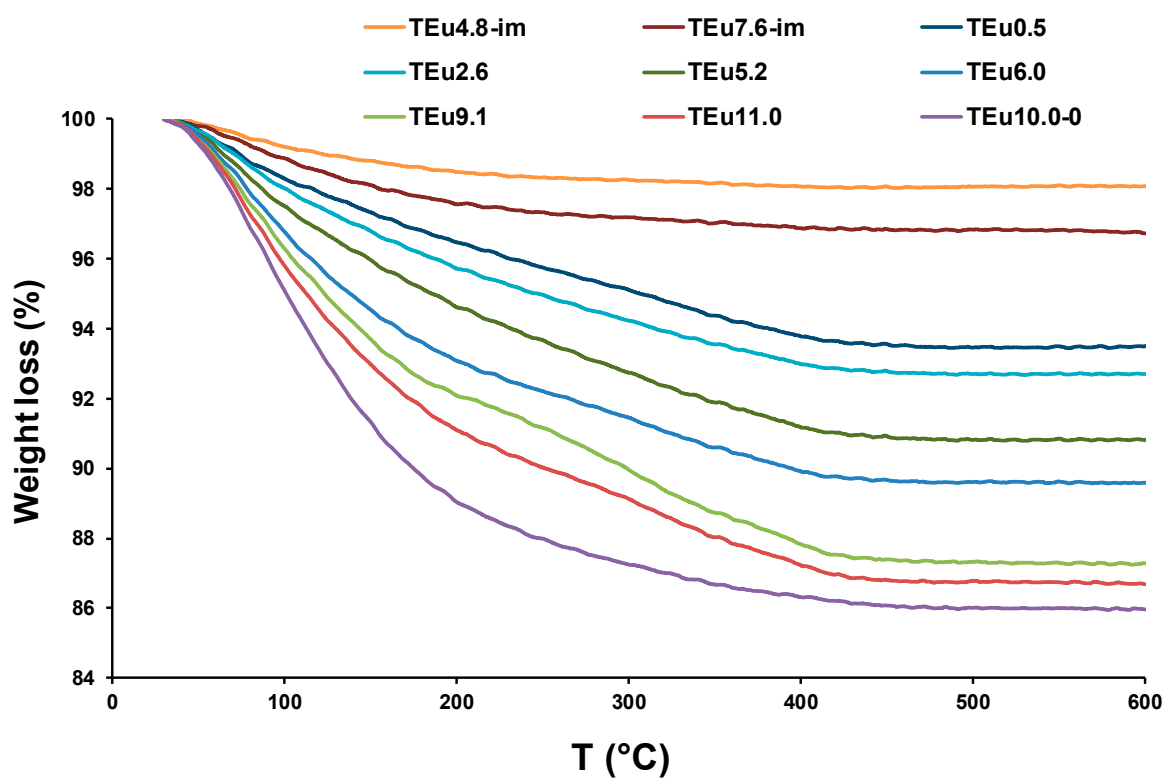


Figure S3. TGA patterns of as-prepared TEuX and TEuX-im samples.

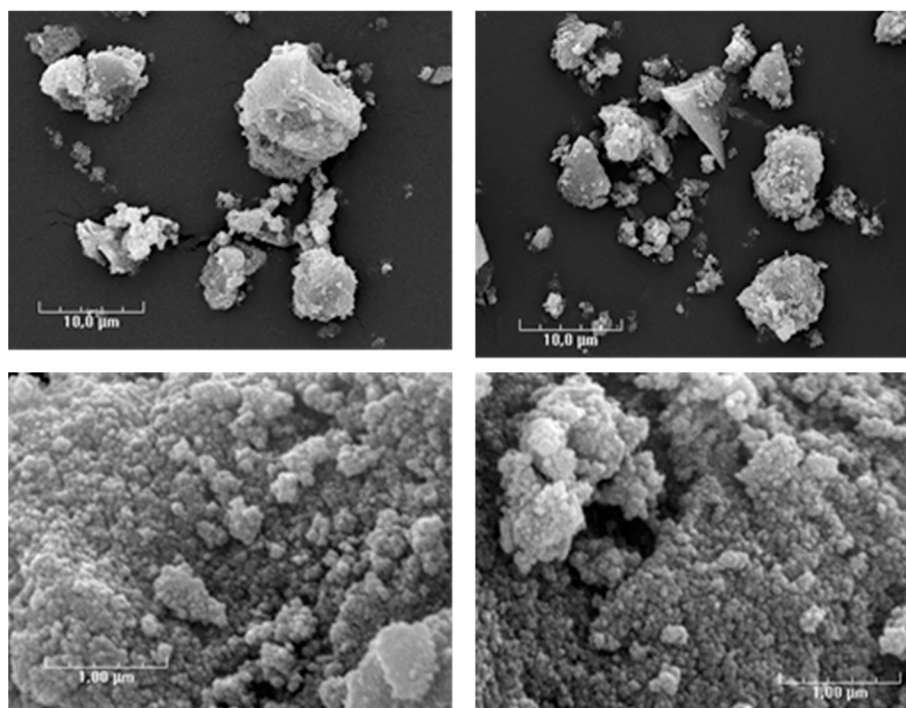


Figure S4. SEM images of TEu0.5 and TEu11.0 samples.

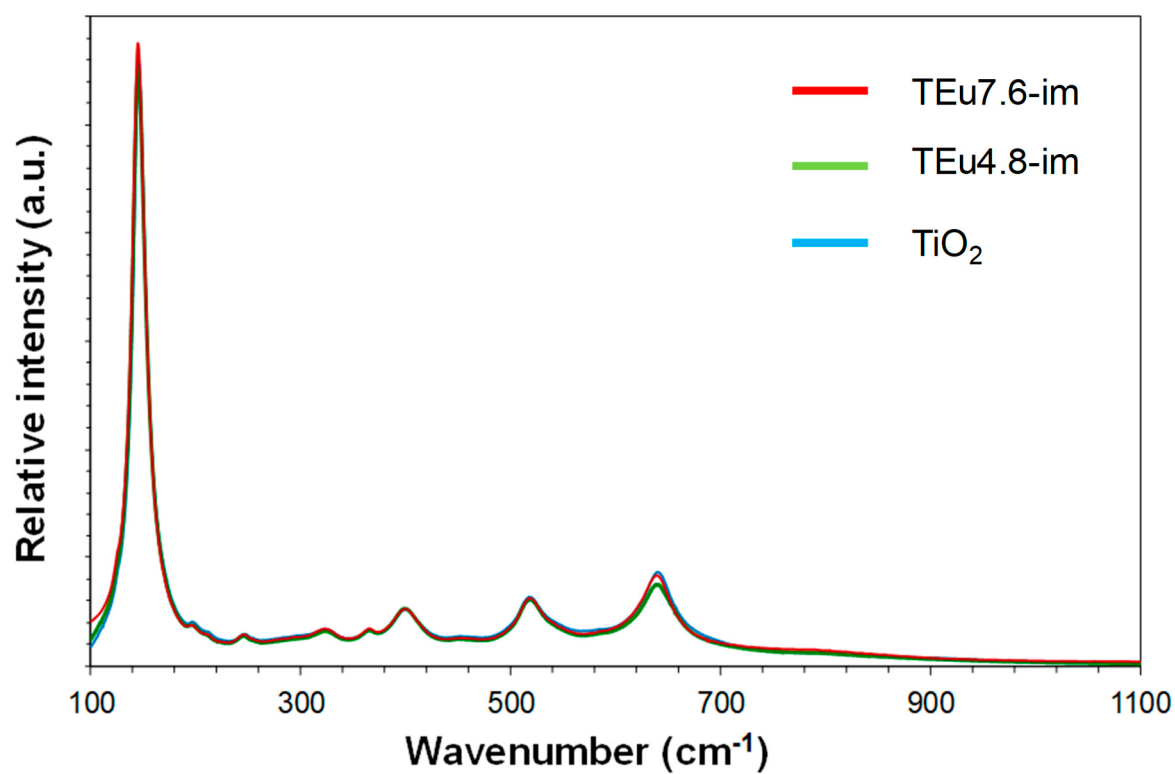


Figure S5. Raman spectra of TiO_2 and TEuX-im samples. The band at 147 cm^{-1} was used for normalization.

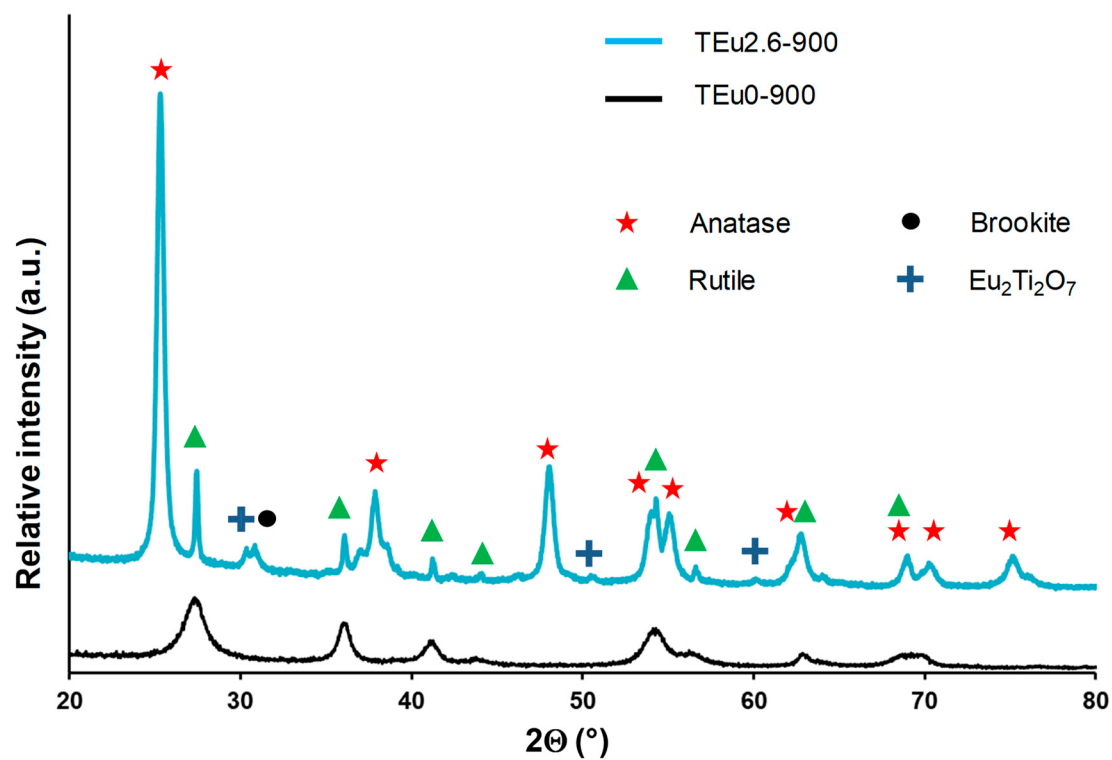


Figure S6. XRD patterns of TEu0-900 and TEu2.6-900 samples.

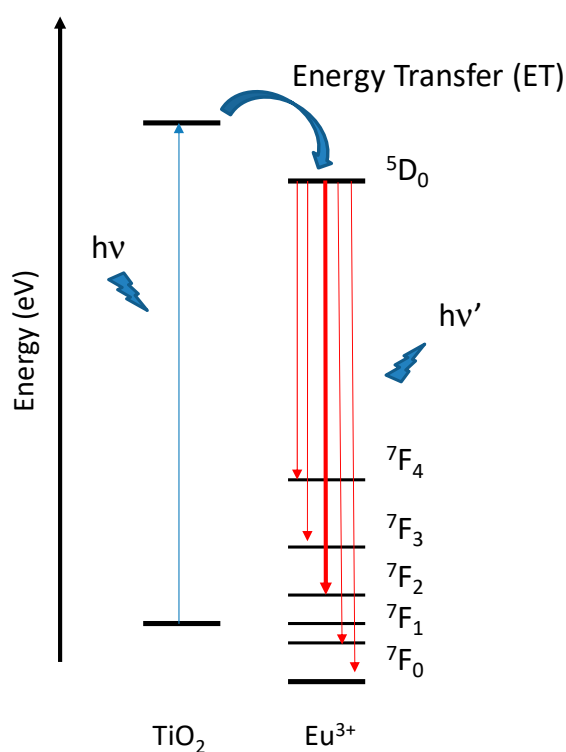


Figure S7: Jablonski diagram showing the excitation process of TiO_2 and energy transfer (ET) to Eu^{3+} levels ions and 4f emissions

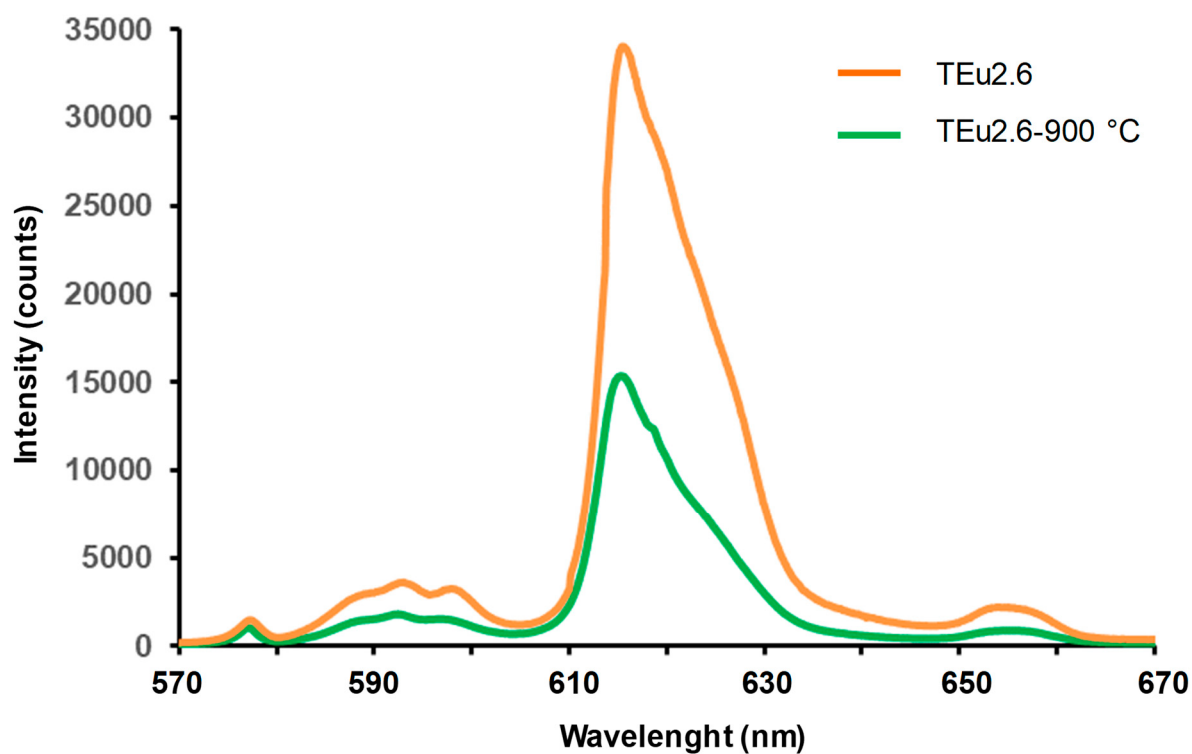


Figure S8: Photoluminescence spectra between 570 and 670 nm of TEu2.6 and TEu2.6-900 °C samples.

Table S1. Elemental analysis data (duplicate) of the TEuX and TEuX-im samples.

Wavelength (nm)	412.97 - 381.697 - 393.048
Sample	Eu content (wt %)
TEu0.5	1.03-1.07
TEu2.6	4.87-4.90
TEu5.2	9.34-9.54
TEu6.0	10.78-10.78
TEu9.1	15.93-15.97
TEu11.0	19.05-19.20
TEu2.7-im	4.82-5.23
TEu4.8-im	8.38-8.40
TEu7.6-im	13.39-13.47
TEu10.0-0	17.23-17.33

Table S2. Ti, O, C and Eu quantitative analysis XPS of the TEuX and TEuX-im samples.

Quantitative analysis (at %)				
Sample	Ti	O	C	Eu3d_{5/2}
TEu10.0-0	15.7	47.1	19.7	14.3
TEu9.1	18.0	49.6	15.3	15.0
TEu4.8-im	18.9	49.3	13.3	16.2
Sample	Ti	O	C	Eu4d_{5/2}
TEu10.0-0	17.5	52.5	22.0	4.4
TEu9.1	20.2	55.8	17.2	4.4
TEu4.8-im	21.9	57.0	15.4	3.0

Table S3. O1s and C1s XPS data of the TEuX and TEuX-im samples.

Decomposition of O1s	a		b		c	
Sample	BE (eV)	Peak %	BE (eV)	Peak %	BE (eV)	Peak %
TEu10.0-0	529.9	61.9	531.1	34.4	532.7	3.7
TEu9.1	529.9	72.8	531.1	23.8	532.7	3.5
TEu4.8-im	529.7	75.2	530.9	23.2	532.8	1.7
Decomposition of C1s	a		b		c	
Sample	BE (eV)	Peak %	BE (eV)	Peak %	BE (eV)	Peak %
TEu10.0-0	284.9	19.7	286.1	63.0	288.9	17.3
TEu9.1	285.0	24.4	286.1	57.8	288.7	17.8
TEu4.8-im	284.9	20.9	286.1	60.4	288.8	18.8