Electronic Supplementary Material (ESI) for Photochemical & Photobiological Sciences.

Real-time detection of the nanoparticle induced phytotoxicity in rice root tip through the visible red emissions of Eu^{3+} ions

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Table S1. Primers used to study the gene expression.

Accession number	Gene name	Sequence (5'-3')	Sequence (5'-3')
LOC_Os01g22490	OsUBQ5	TGAAGACCCTGACTG GGAAG	CACGGTTCAACAACA TCCAG
LOC_Os05g02070	OsMT2b	CAGCTTATATGTAGG CAGGC	GGGATGAAAGCAGAG GTAGA
AB012765.1	OsOVP1	CTGGTGCATCTGAGC ATGCA	CGGAGGGAACTATAT GGGTC
Os11g0704500	OsMT1	ATGTCTTGCAGCTGT GGA	AGTTGCAAGGGTTGC ACC
Os01g0149750	OsMT2	ATGTCGTGCTGCGGA GGA	GCAGTTGCAGGGGTT GCA
LOC_Os02g51110	OsNIP2;1	ACCATGTACTACGGC GAG	CGCGCATATCGCTCC GGT
LOC_Os01g71310	OsCKX4	GACCGACTACCTCCA TCTCACA	GGTTGACATTGCTGA CCTGC
LOC_Os07g48560	OsWOX11	CCCTTGTCCGTTGGA TCAGA	CCATGCGTACGTGCA GCATT
LOC_Os03g05510	OsCRL1	ATGACGGGATTTGGA TCGC	CTTGCTCGTGGCAGA AGTAT
LOC_Os06g34180	OsFCP2	GAGGACGATGACGA TGATGATGG	ACCACCATTATTCCCT CGTTCAC
Os03g0118400	OsCDK1	CTGTTCCCTGGTGAT TCTGA	TCCAATGTAAAGCCA TAGCAG
Os02g0123100	OsCDK2	GCCTCATCTTTCCAT TTGT	CCCGCAATAAGGATC TTTCA
AY941774	OsRB1	AGCTGACTGTGAGCG TCTAT	GACCGTGGGAACAAA TACTT
AY941775	OsRB2	CTCGGCTATCTCGGT TTCC	CACTGTTTAGGCGGTT GTTT

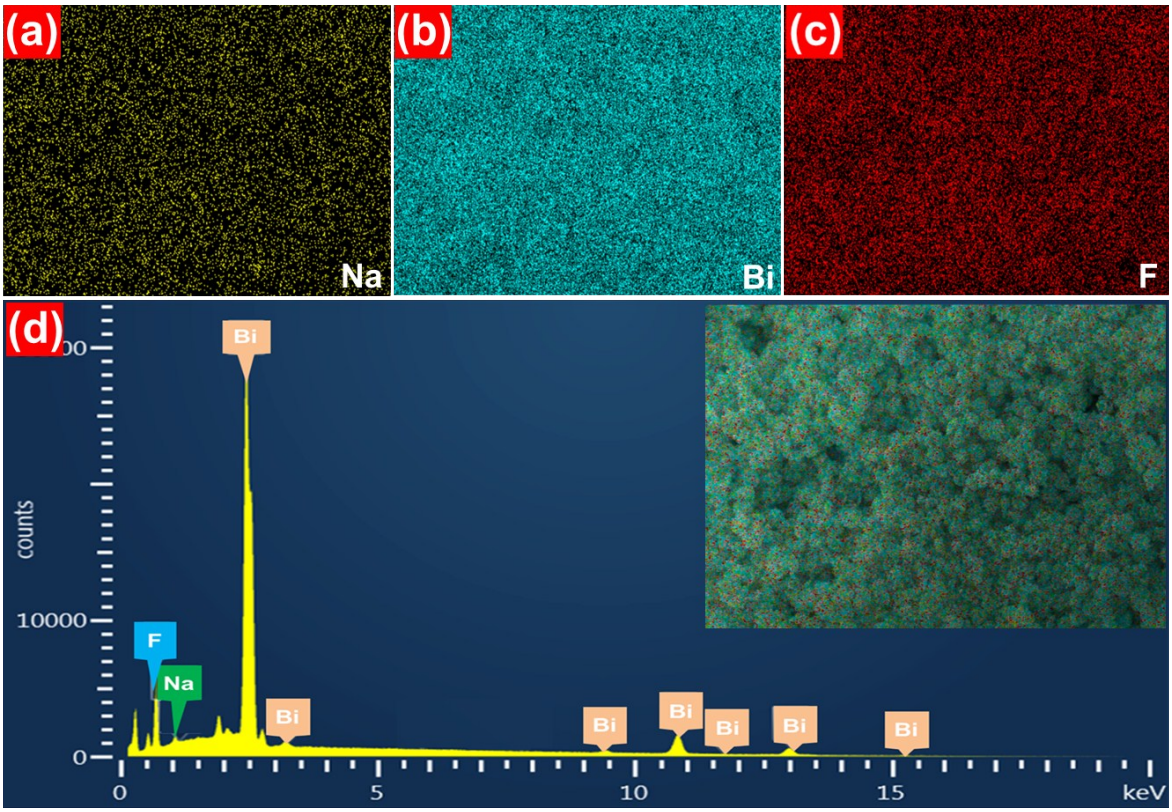

Figure S1 (a)-(c) Elemental mappings and (d) EDX spectrum of $NaBiF_4$ nanoparticles. Inset shows the HR-FE-SEM image for the elemental mappings.

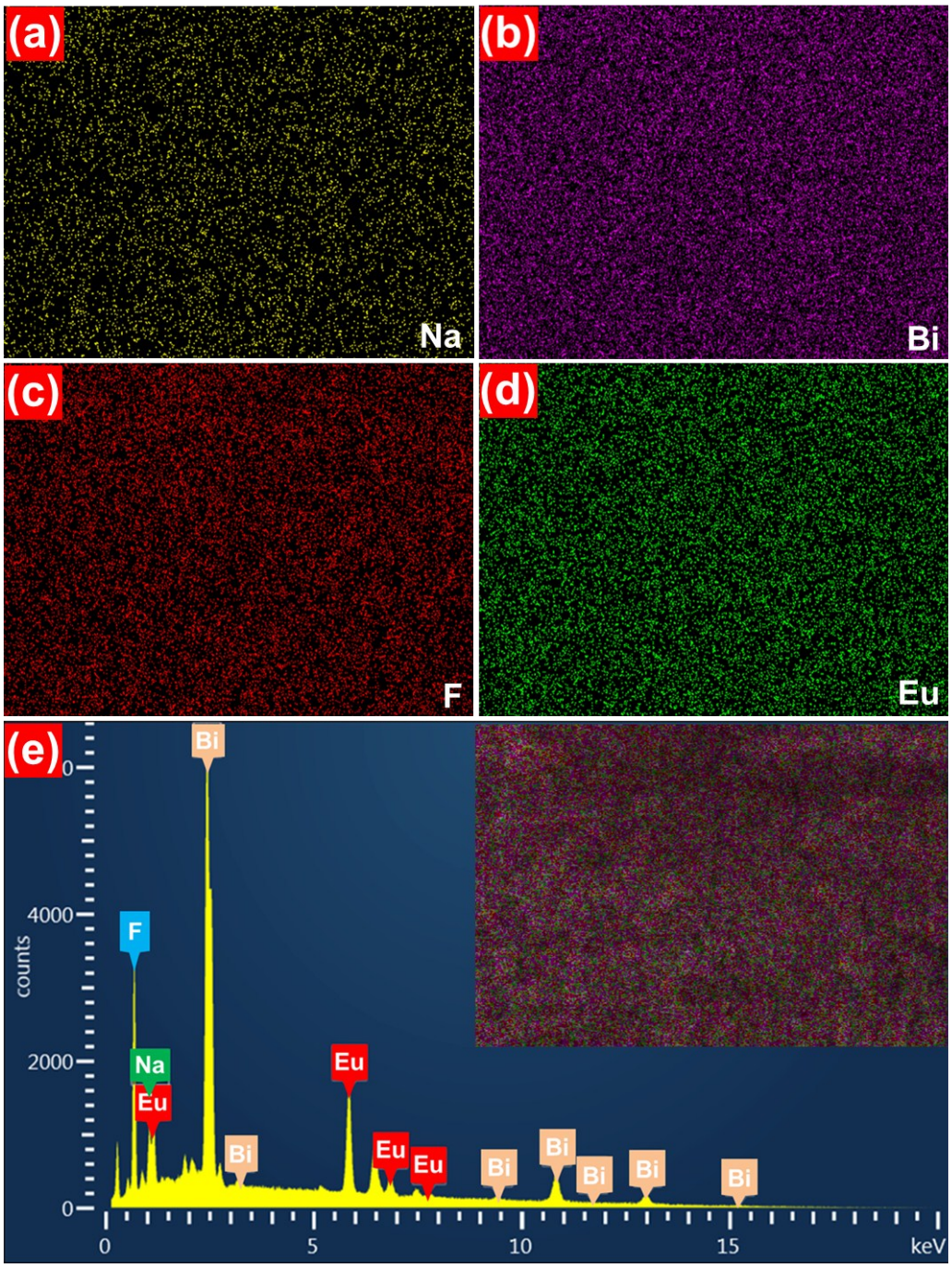

Figure S2 (a)-(d) Elemental mappings and (e) EDX spectrum of $NaBiF_4:Eu^{3+}$ nanoparticles. Inset shows the HR-FE-SEM image for elemental mapping.

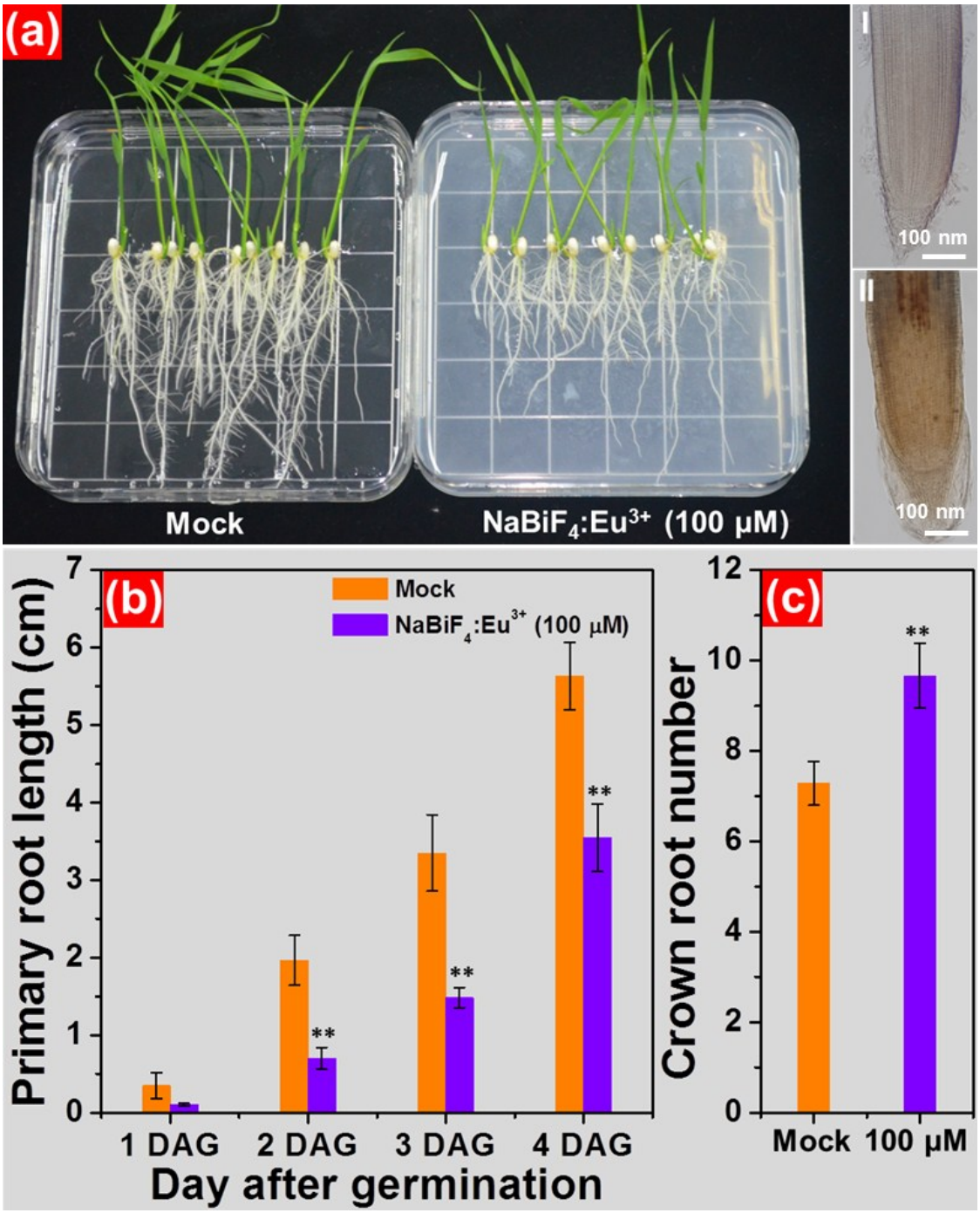

Figure S3 (a) Images of rice seedling grown in different conditions. I: amplified root of WT-CT; II: amplified root of WT treated with 100 μM $NaBiF_4:Eu^{3+}$ nanoparticles. (b) Primary root length. (c) Crown root number. Error bars represent standard error of at least 5 samples. * P, < 0.01, ** P, < 0.001.

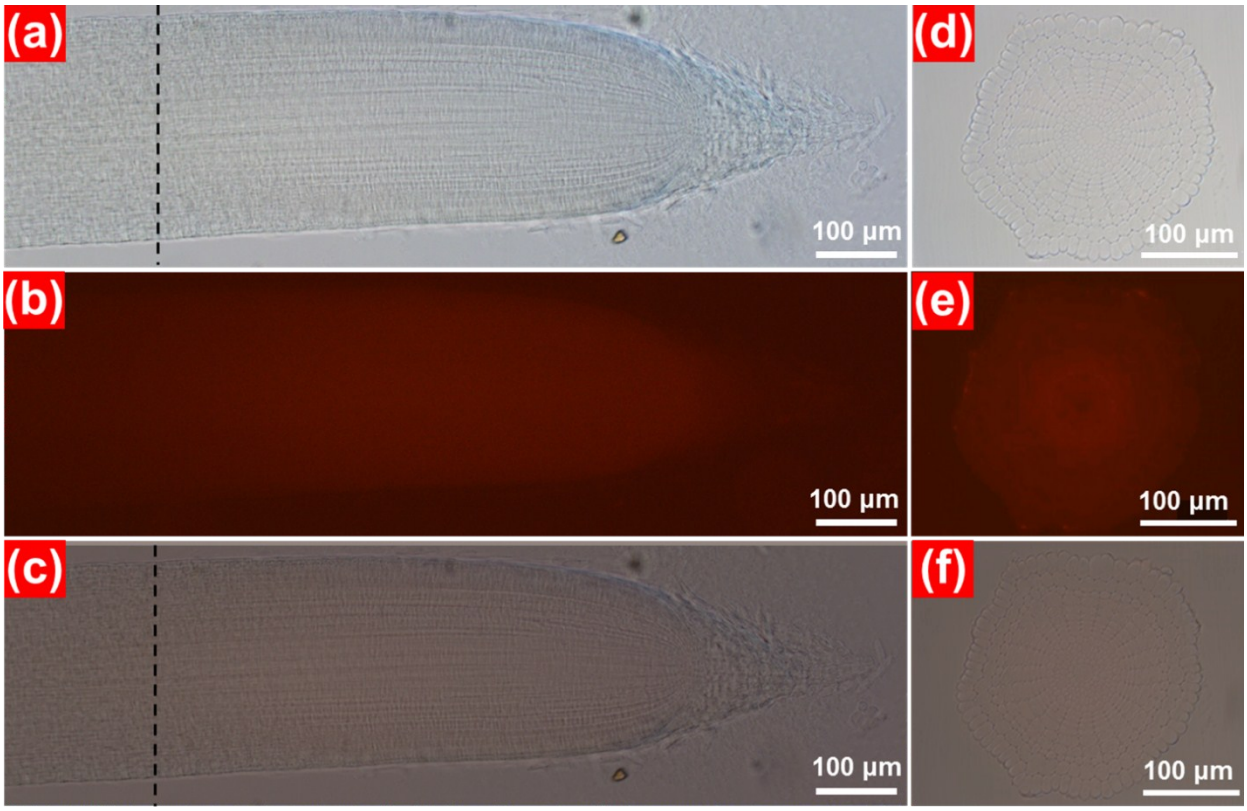

Figure S4 Rice root tip treated with 100 μM $NaBiF_4:Eu^{3+}$ nanoparticles at 4 DAG: (a) Bright channel, (b) RFP channel, and (c) Merge channel. Cross section of rice root tip treated with 100 µM $NaBiF_4:Eu^{3+}$ nanoparticles at 4 DAG: (d) Bright channel, (e) RFP channel, and (f) Merge channel.

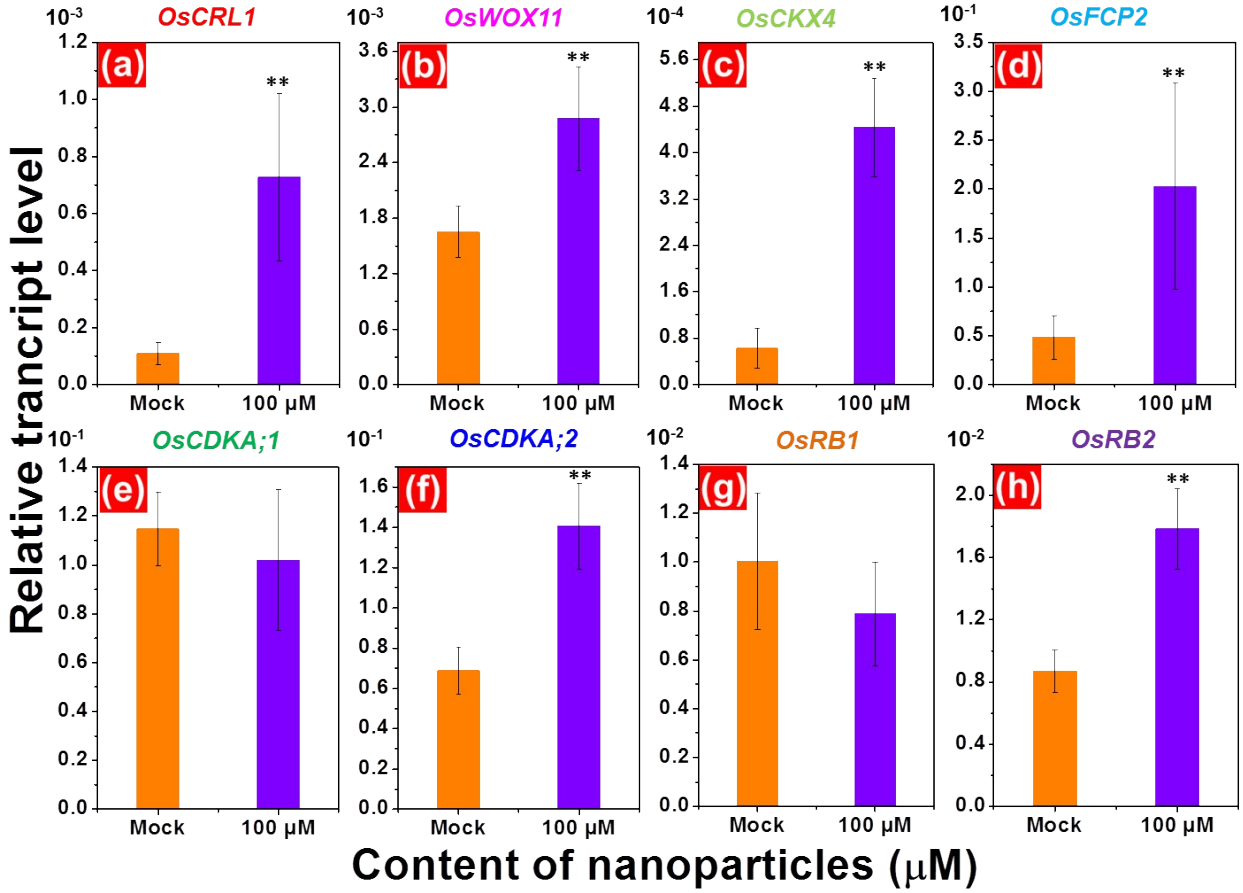

Figure S5 Expression levels of crown root genes relative to *OsUBQ5*, evaluated at young seedling stage: (a) *OsCRL1*, (b) *OsWOX11,* (c) *OsCKX4,* (d) *OsFCP2,* (e) *OsCDKA;1,* (f) *OsCDKA;2*, (g) *OsRB1, and* (h) *OsRB2*. Error bars represent standard error of at least 3 samples. * P, < 0.01, ** P, < 0.001.