Supporting Information

Expanding the Horizons of Phase Transition-Based Luminescence Thermometry

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KEYWORDS luminescence thermometry, optical sensors, ratiometric approach, phase transition

$LaGaO_3$:0.25%Eu^{3+} measured at 298 K

Global Parameters

Number of used phases:	2
Number of variables:	13
Number of constraints:	0
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,129(2)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,75962
R (profile)/ %:	3,44776
R (weighted profile)/ %:	4,52719
GOF:	6,61943
d-statistic:	0,59222
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000

Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1523
F(000):	443,4400
Weight fraction/ %:	100,0(3)
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,4903(2)
b/ A:	7,7746(3)
c/ A:	5,5221(2)
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,70750
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,127(9)
V Left:	-0,041(8)
W Left:	0,012(2)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,74(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	3,86654

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2137
F(000):	672,0000
Weight fraction/ %:	0,000000
Space group (No.):	R -3 c (167)

Lattice parameters:	
a/ A:	5,528625
b/ A:	5,528625
c/ A:	13,387920
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,38710
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,063830
V Left:	-0,034732
W Left:	0,022482
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,657620
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

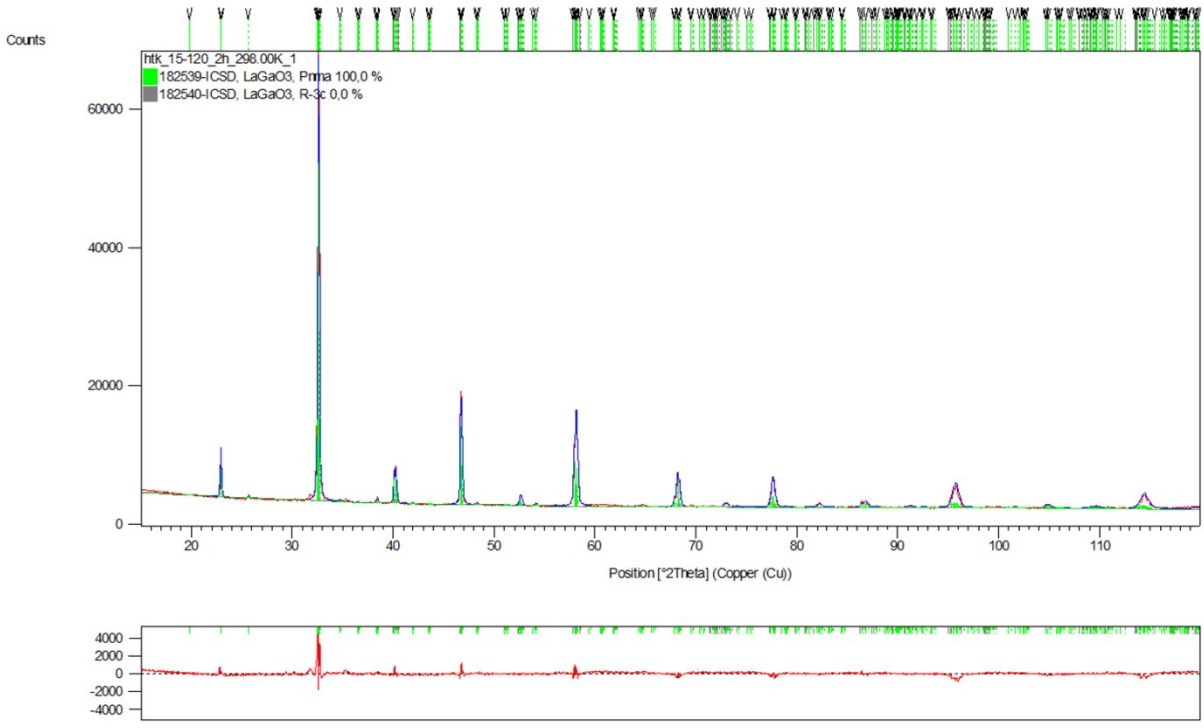

Figure S1. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 298K.

$LaGaO_3$:0.25%Eu^{3+} measured at 323 K

Global Parameters

Number of used phases:	2
Number of variables:	13
Number of constraints:	0
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,134(2)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,75001
R (profile)/ %:	3,33585
R (weighted profile)/ %:	4,41947
GOF:	6,37764
d-statistic:	0,60488
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1482
F(000):	443,4400
Weight fraction/ %:	100,0(3)
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,4911(2)
b/ A:	7,7759(3)
c/ A:	5,5234(2)
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,84040
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,127(9)
V Left:	-0,041(8)
W Left:	0,012(2)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000

Peak shape:	
parameter 1 Left:	0,74(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	3,83831

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2137
F(000):	672,0000
Weight fraction/ %:	0,000000
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,528625
b/ A:	5,528625
c/ A:	13,387920
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,38710
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,063830
V Left:	-0,034732
W Left:	0,022482
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,657620
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

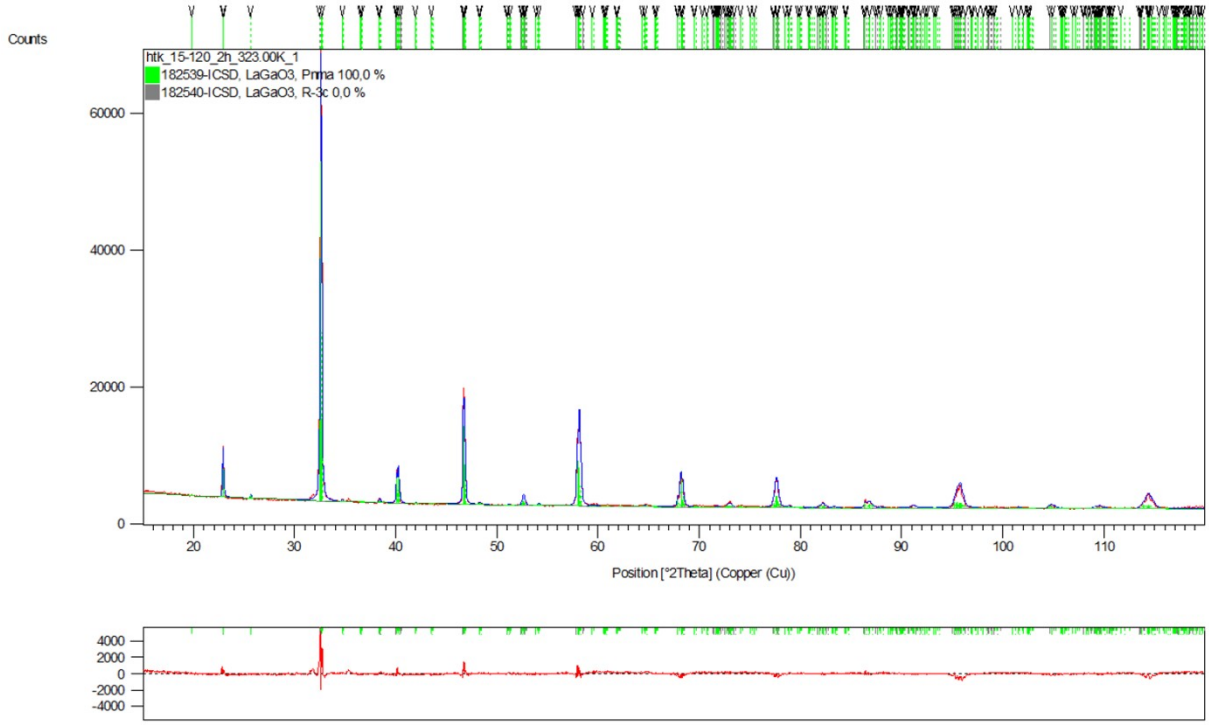

Figure S2. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 323K.

$LaGaO_3$:0.25%Eu^{3+} measured at 348 K

Global Parameters

Number of used phases:	2
Number of variables:	13
Number of constraints:	0
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,138(2)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,74636
R (profile)/ %:	3,40377
R (weighted profile)/ %:	4,52397
GOF:	6,71077
d-statistic:	0,58802
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function

Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1447
F(000):	443,4400
Weight fraction/ %:	100,0(3)
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,4917(2)
b/ A:	7,7771(3)
c/ A:	5,5247(2)
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,95810
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,127(9)
V Left:	-0,042(8)
W Left:	0,012(2)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,75(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	4,18336

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2137
F(000):	672,0000
Weight fraction/ %:	0,000000
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,528625
b/ A:	5,528625
c/ A:	13,387920
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,38710
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000

Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,063830
V Left:	-0,034732
W Left:	0,022482
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,657620
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

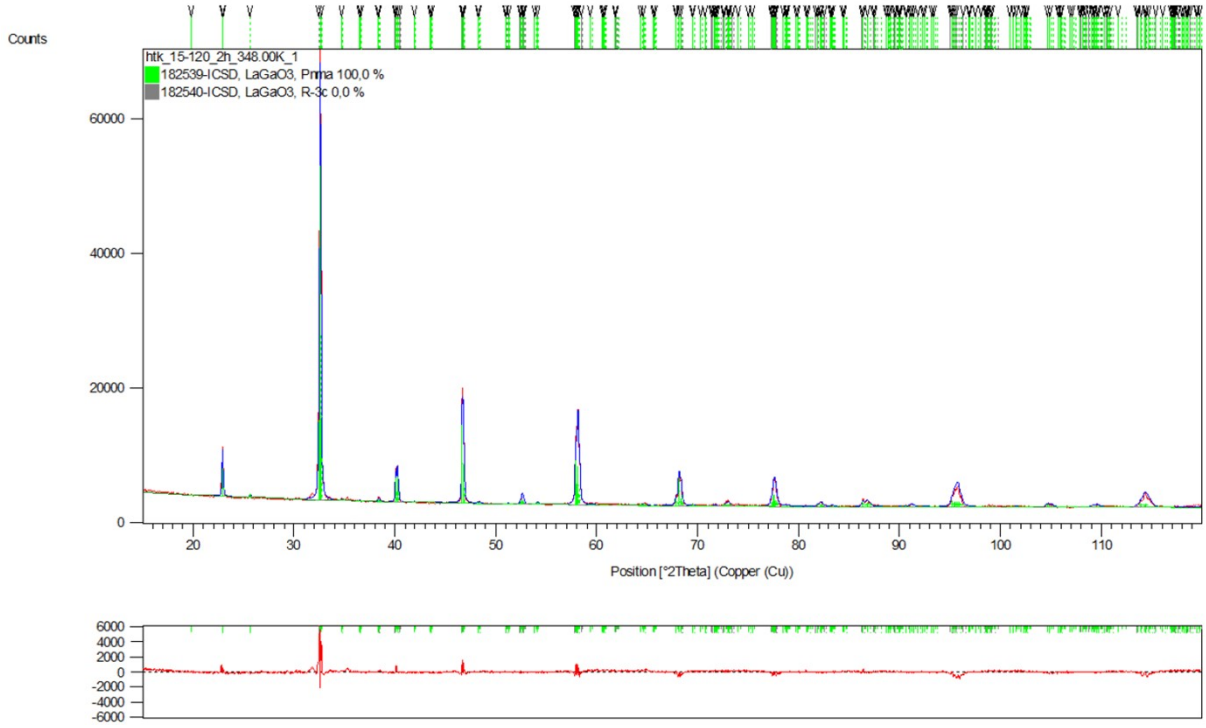

Figure S3. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 348K.

$LaGaO_3$:0.25%Eu^{3+} measured at 373 K

Global Parameters

Number of used phases:	2
Number of variables:	13
Number of constraints:	0
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,149(2)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,74226
R (profile)/ %:	3,44605

R (weighted profile)/ %:	4,55962
GOF:	6,84907
d-statistic:	0,58201
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1393
F(000):	443,4400
Weight fraction/ %:	100,0(3)
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,4926(2)
b/ A:	7,7792(3)
c/ A:	5,5265(2)
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	236,13450
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,127(9)
V Left:	-0,042(8)
W Left:	0,013(2)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,77(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	4,16703

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000

O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2137
F(000):	672,0000
Weight fraction/ %:	0,000000
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,528625
b/ A:	5,528625
c/ A:	13,387920
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,38710
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,063830
V Left:	-0,034732
W Left:	0,022482
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,657620
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

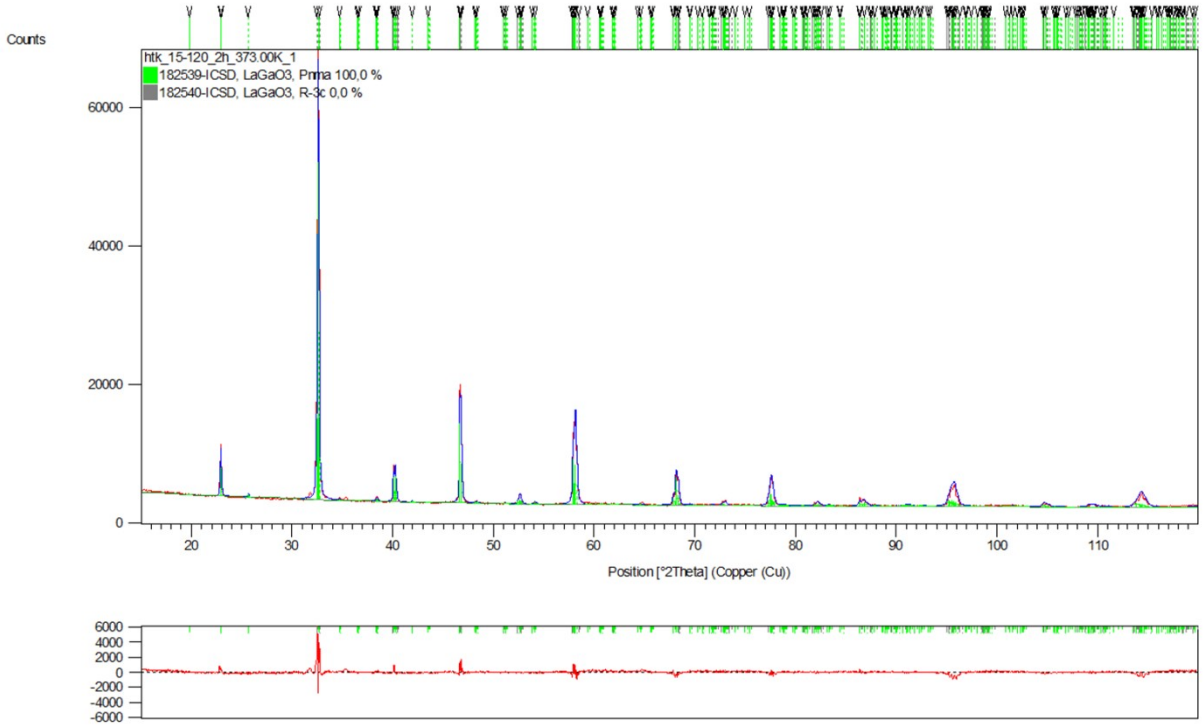

Figure S4. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 373K.

$LaGaO_3$:0.25%Eu^{3+} measured at 398 K

Global Parameters

Number of used phases:	2
Number of variables:	16
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,150(2)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,73724
R (profile)/ %:	3,12868
R (weighted profile)/ %:	4,05355
GOF:	5,44440
d-statistic:	0,66104
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000

Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1368
F(000):	443,4400
Weight fraction/ %:	77(1)
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,4949(2)
b/ A:	7,7786(3)
c/ A:	5,5266(2)
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	236,21940
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,124(9)
V Left:	-0,062(8)
W Left:	0,017(2)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,71(2)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	3,26145

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2162
F(000):	672,0000
Weight fraction/ %:	23(1)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,5279(3)
b/ A:	5,5279(3)
c/ A:	13,387(1)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,26490
Overall displacement parameter:	0,000000
Extinction:	0,000000

Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,063830
V Left:	-0,034732
W Left:	0,022482
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,657620
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	3,07097

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

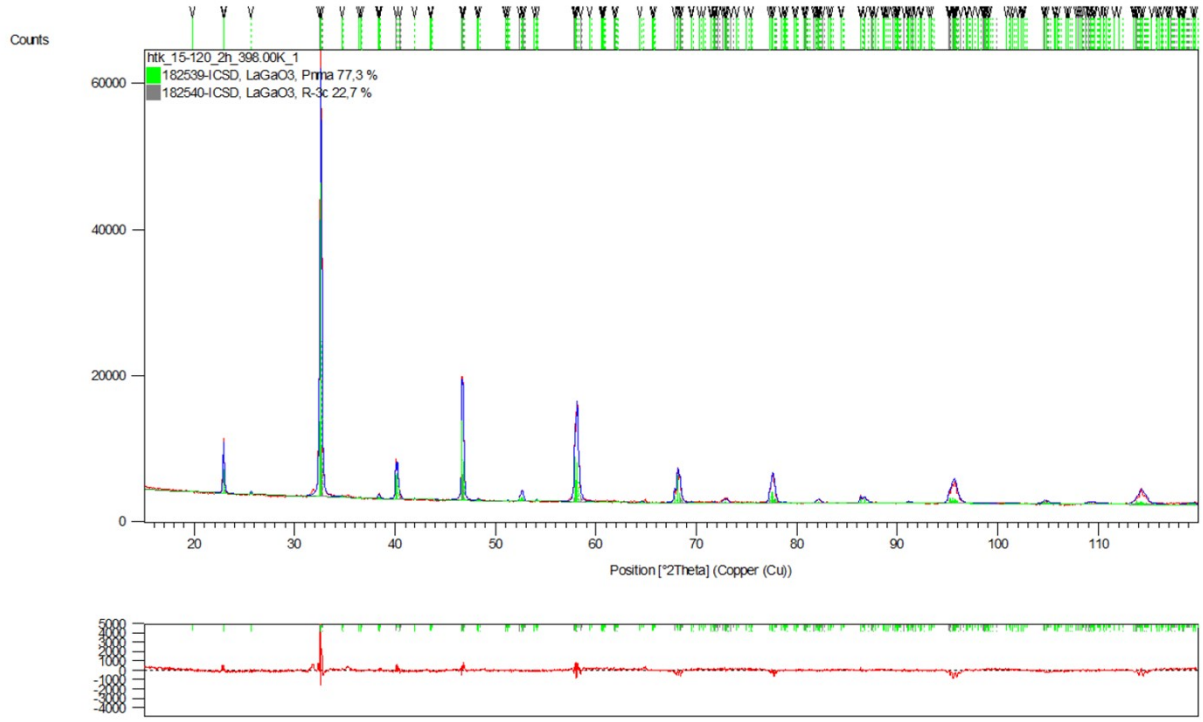

Figure S5. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 398K.

$LaGaO_3$:0.25%Eu^{3+} measured at 423 K

Global Parameters

Number of used phases:	2
Number of variables:	12
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,155(2)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,73519

R (profile)/ %:	2,95104
R (weighted profile)/ %:	3,76240
GOF:	4,70150
d-statistic:	0,60857
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1327
F(000):	443,4400
Weight fraction/ %:	44,9(5)
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,4952(3)
b/ A:	7,7826(4)
c/ A:	5,5265(4)
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	236,35240
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,134034
V Left:	-0,044266
W Left:	0,013661
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,827525
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	2,39304

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000

Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2169
F(000):	672,0000
Weight fraction/ %:	55(1)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,5283(2)
b/ A:	5,5283(2)
c/ A:	13,3836(5)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,22700
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,063830
V Left:	-0,034732
W Left:	0,022482
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,657620
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	2,23221

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

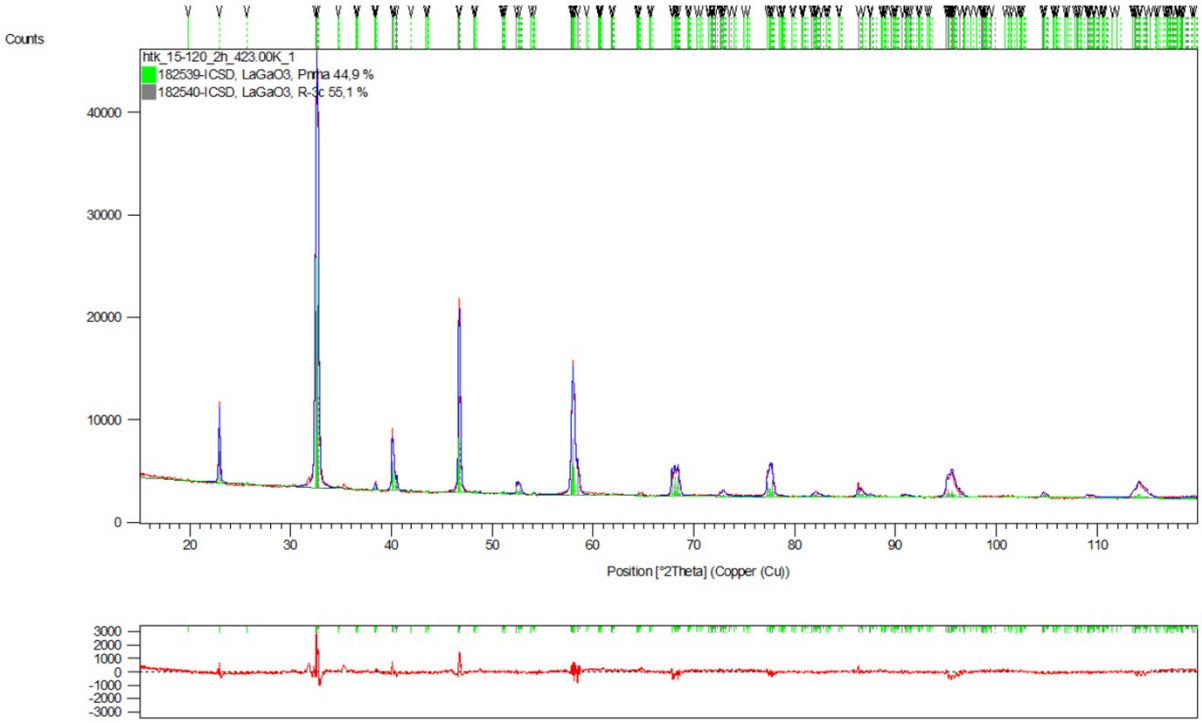

Figure S6. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 423K.

$LaGaO_3$:0.25%Eu^{3+} measured at 448 K

Global Parameters

Number of used phases:	2
Number of variables:	16
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,168(1)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,73497
R (profile)/ %:	2,74494
R (weighted profile)/ %:	3,48928
GOF:	4,04470
d-statistic:	0,88560
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function

Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1235
F(000):	443,4400
Weight fraction/ %:	15,2(4)
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,4967(8)
b/ A:	7,785(1)
c/ A:	5,5305(9)
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	236,65790
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,134034
V Left:	-0,044266
W Left:	0,013661
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,827525
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,83952

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2129
F(000):	672,0000
Weight fraction/ %:	85(1)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,53008(9)
b/ A:	5,53008(9)
c/ A:	13,3823(3)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,42420
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000

Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,051(4)
V Left:	-0,034(4)
W Left:	0,0203(9)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,64(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,53172

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

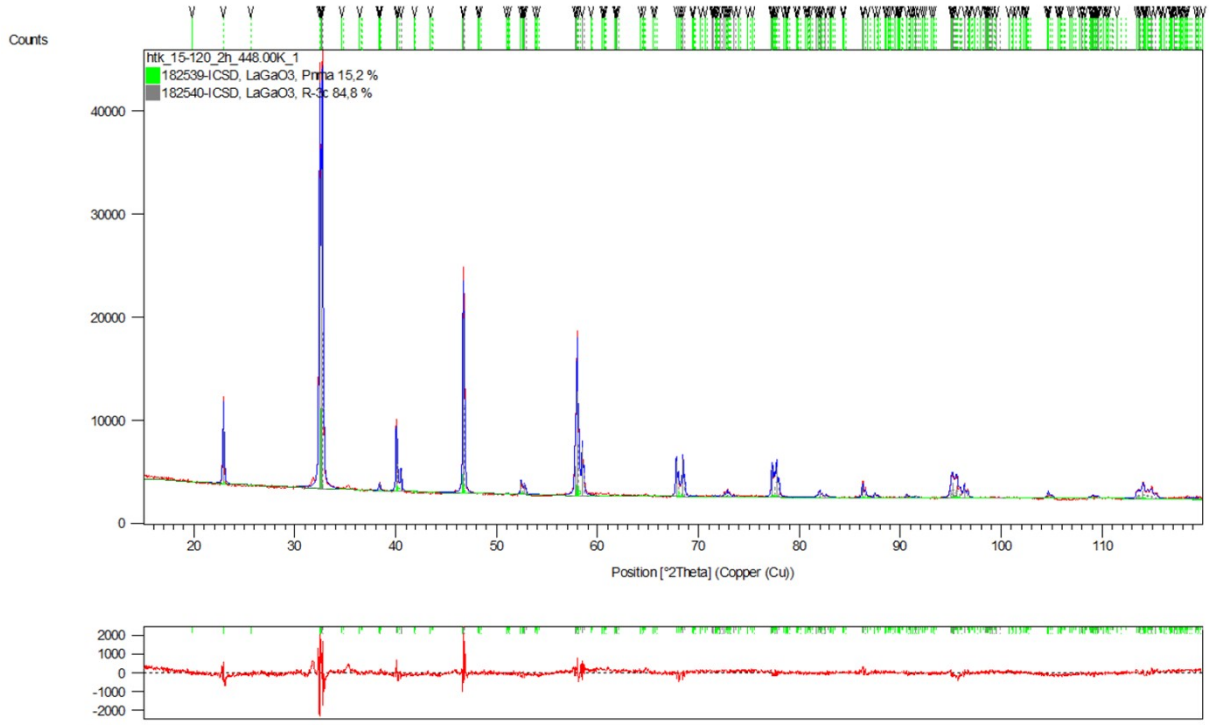

Figure S7. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 448K.

$LaGaO_3$:0.25%Eu^{3+} measured at 473 K

Global Parameters

Number of used phases:	2
Number of variables:	12
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,172(1)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,74023
R (profile)/ %:	2,91641

R (weighted profile)/ %:	3,90737
GOF:	5,04144
d-statistic:	0,63960
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1552
F(000):	443,4400
Weight fraction/ %:	0,000000
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,489476
b/ A:	7,773388
c/ A:	5,521482
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,61170
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,055434
V Left:	-0,002425
W Left:	0,011910
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,537855
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000

O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2081
F(000):	672,0000
Weight fraction/ %:	100,0(3)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,53006(9)
b/ A:	5,53006(9)
c/ A:	13,3913(3)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,66150
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,062(5)
V Left:	-0,036(5)
W Left:	0,022(1)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,68(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,94691

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

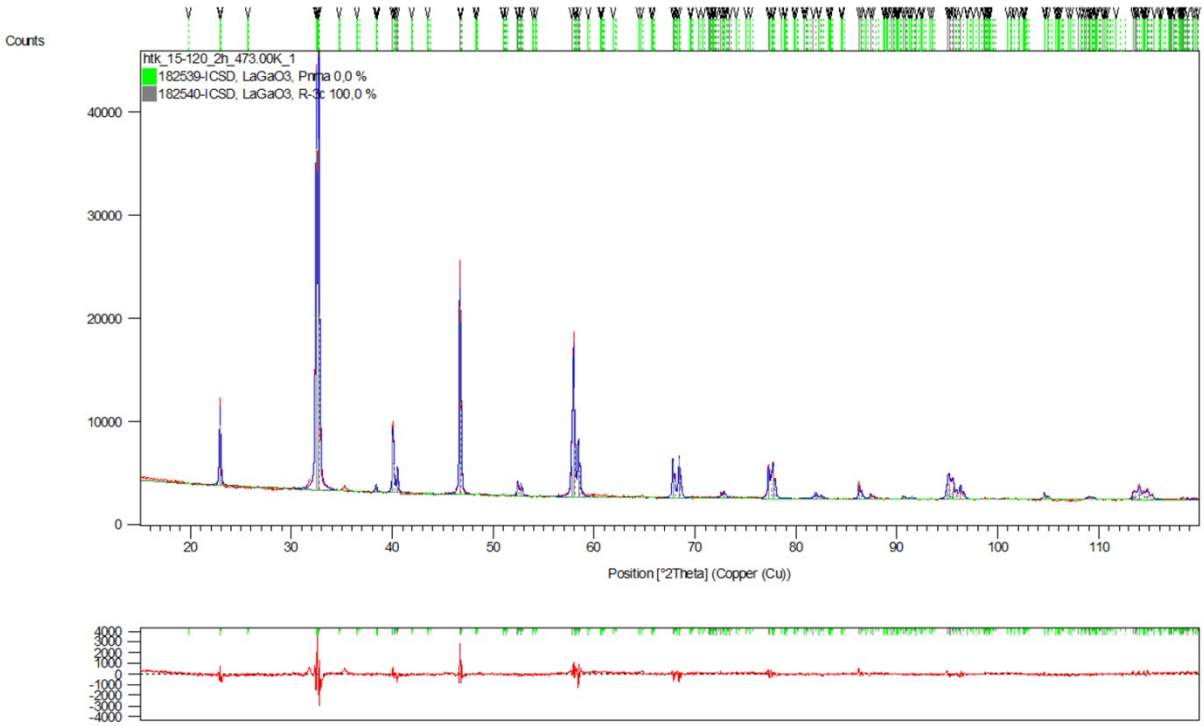

Figure S8. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 473K.

$LaGaO_3$:0.25%Eu^{3+} measured at 498 K

Global Parameters

Number of used phases:	2
Number of variables:	12
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,181(1)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,73873
R (profile)/ %:	2,96510
R (weighted profile)/ %:	3,92990
GOF:	5,10859
d-statistic:	0,65847
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function

Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1552
F(000):	443,4400
Weight fraction/ %:	0,000000
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,489476
b/ A:	7,773388
c/ A:	5,521482
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,61170
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,055434
V Left:	-0,002425
W Left:	0,011910
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,537855
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,2024
F(000):	672,0000
Weight fraction/ %:	100,0(3)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,53115(9)
b/ A:	5,53115(9)
c/ A:	13,3967(3)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	354,94270
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000

Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,061(5)
V Left:	-0,036(5)
W Left:	0,022(1)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,69(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,96185

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

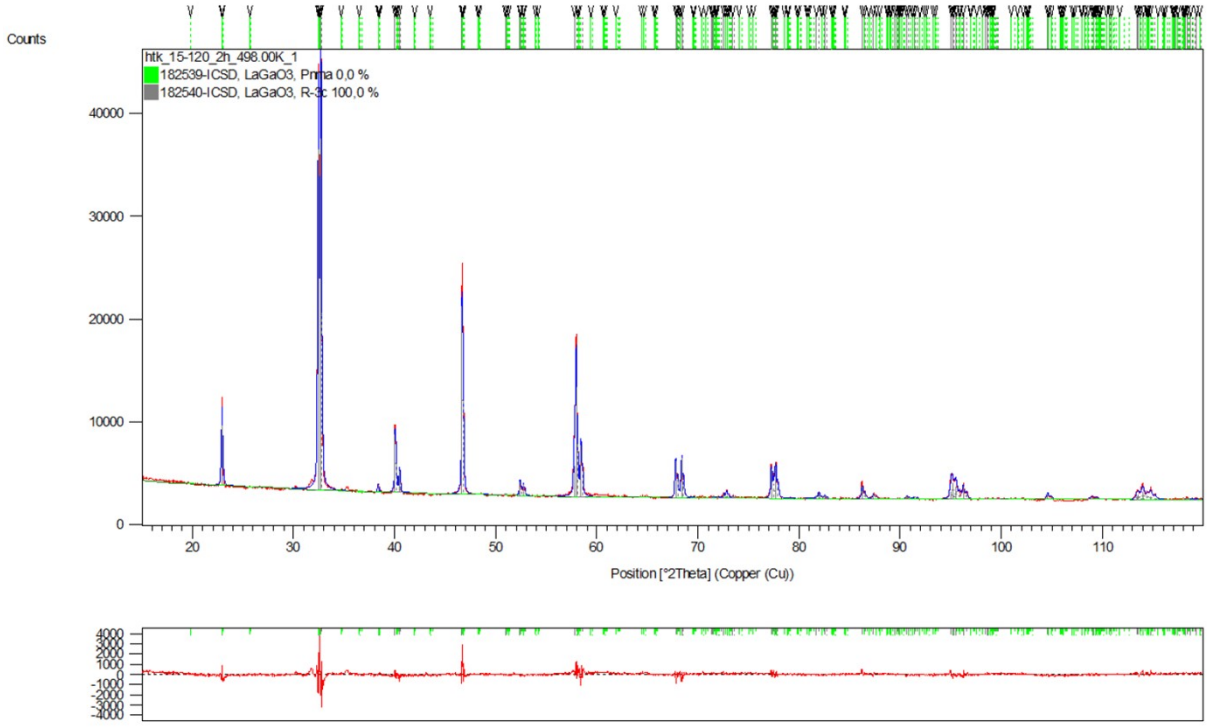

Figure S9. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 498K.

$LaGaO_3$:0.25%Eu^{3+} measured at 523 K

Global Parameters

Number of used phases:	2
Number of variables:	12
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,190(1)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,73334
R (profile)/ %:	2,99479

R (weighted profile)/ %:	3,93770
GOF:	5,16077
d-statistic:	0,66035
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1552
F(000):	443,4400
Weight fraction/ %:	0,000000
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,489476
b/ A:	7,773388
c/ A:	5,521482
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,61170
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,055434
V Left:	-0,002425
W Left:	0,011910
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,537855
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000

O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,1971
F(000):	672,0000
Weight fraction/ %:	100,0(3)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,53230(9)
b/ A:	5,53230(9)
c/ A:	13,4010(3)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	355,20550
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,061(5)
V Left:	-0,036(5)
W Left:	0,022(1)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,69(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,97464

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

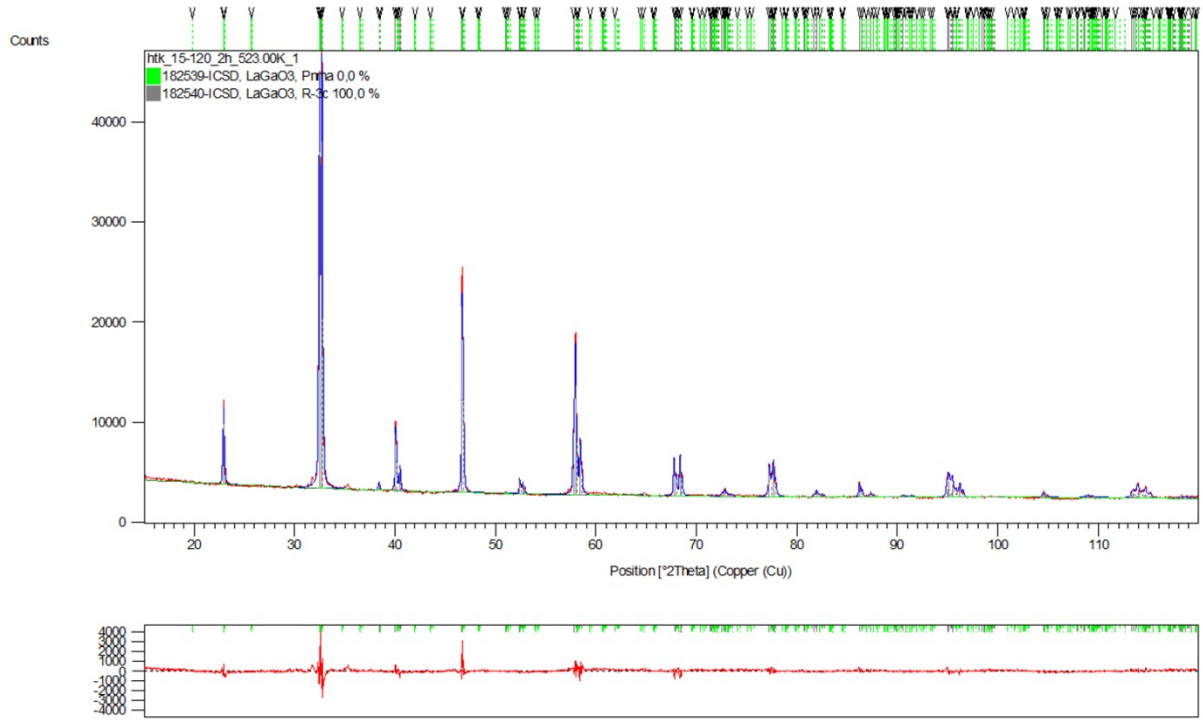

Figure S10. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 523K.

$LaGaO_3$:0.25%Eu^{3+} measured at 548 K

Global Parameters

Number of used phases:	2
Number of variables:	12
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,209(1)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,75572
R (profile)/ %:	2,84899
R (weighted profile)/ %:	3,97392
GOF:	5,12307
d-statistic:	0,65204
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function

Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1552
F(000):	443,4400
Weight fraction/ %:	0,000000
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,489476
b/ A:	7,773388
c/ A:	5,521482
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,61170
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,055434
V Left:	-0,002425
W Left:	0,011910
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,537855
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,1911
F(000):	672,0000
Weight fraction/ %:	100,0(3)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,53352(9)
b/ A:	5,53352(9)
c/ A:	13,4061(3)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	355,49850
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000

Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,060(5)
V Left:	-0,037(5)
W Left:	0,022(1)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,70(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,90850

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

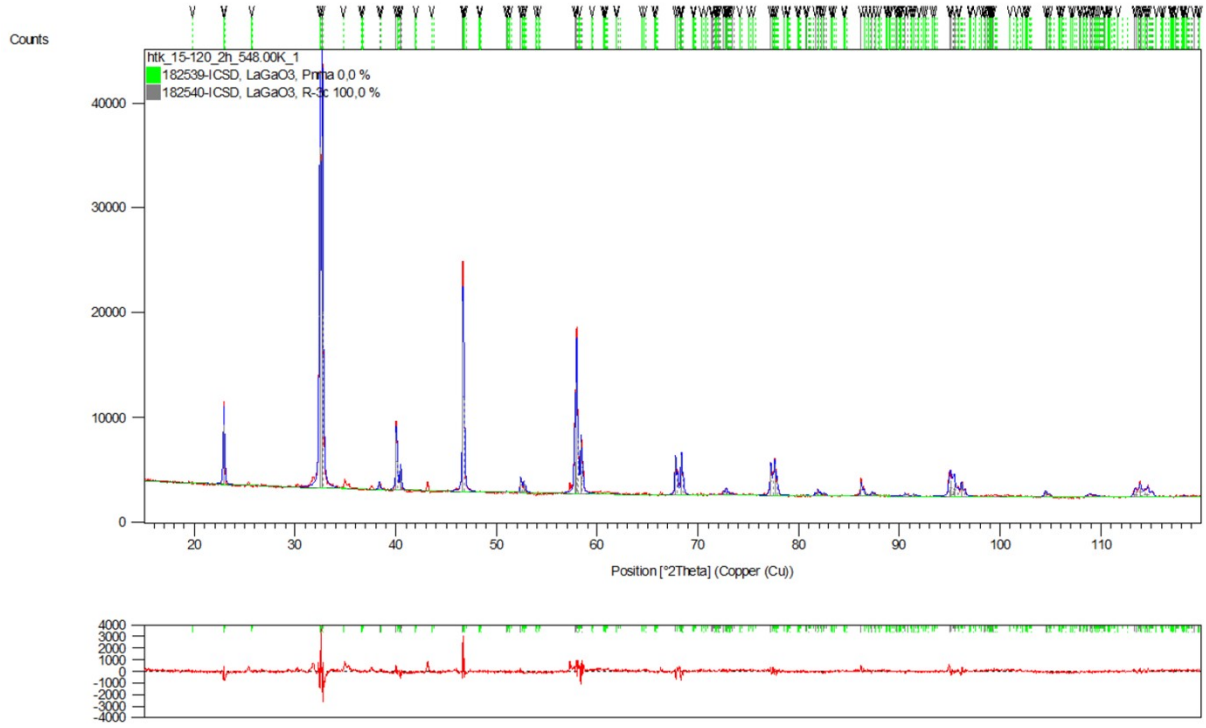

Figure S11. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 548K.

$LaGaO_3$:0.25%Eu^{3+} measured at 573 K

Global Parameters

Number of used phases:	2
Number of variables:	12
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,218(1)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,75628
R (profile)/ %:	2,83888

R (weighted profile)/ %:	3,93210
GOF:	5,01259
d-statistic:	0,66767
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1552
F(000):	443,4400
Weight fraction/ %:	0,000000
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,489476
b/ A:	7,773388
c/ A:	5,521482
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,61170
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,055434
V Left:	-0,002425
W Left:	0,011910
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,537855
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000

O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,1856
F(000):	672,0000
Weight fraction/ %:	100,0(3)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,53460(9)
b/ A:	5,53460(9)
c/ A:	13,4113(3)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	355,77450
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,060(4)
V Left:	-0,037(4)
W Left:	0,021(1)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,70(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,87495

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

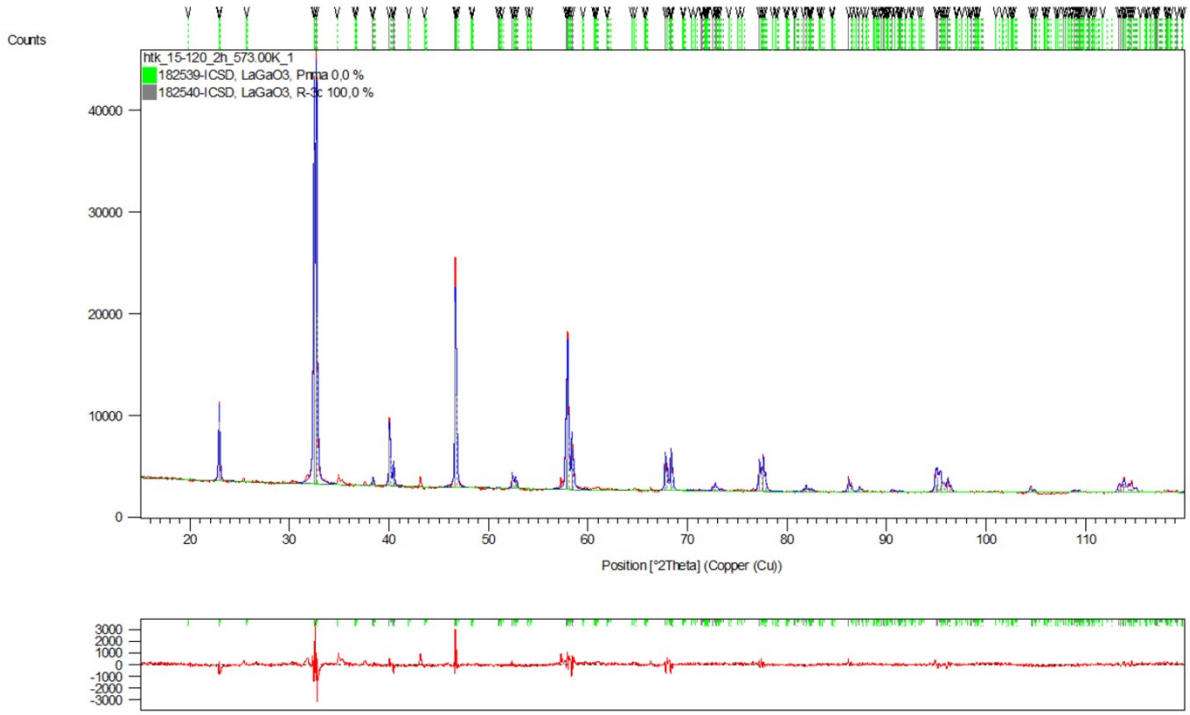

Figure S12. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 573K.

$LaGaO_3$:0.25%Eu^{3+} measured at 598 K

Global Parameters

Number of used phases:	2
Number of variables:	12
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,229(1)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,75943
R (profile)/ %:	2,93121
R (weighted profile)/ %:	4,01017
GOF:	5,19499
d-statistic:	0,66489
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function

Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1552
F(000):	443,4400
Weight fraction/ %:	0,000000
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,489476
b/ A:	7,773388
c/ A:	5,521482
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,61170
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,055434
V Left:	-0,002425
W Left:	0,011910
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,537855
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000
O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,1795
F(000):	672,0000
Weight fraction/ %:	100,0(3)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,53587(9)
b/ A:	5,53587(9)
c/ A:	13,4165(3)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	356,07460
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000

Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,056(4)
V Left:	-0,036(4)
W Left:	0,021(1)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,70(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,92145

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

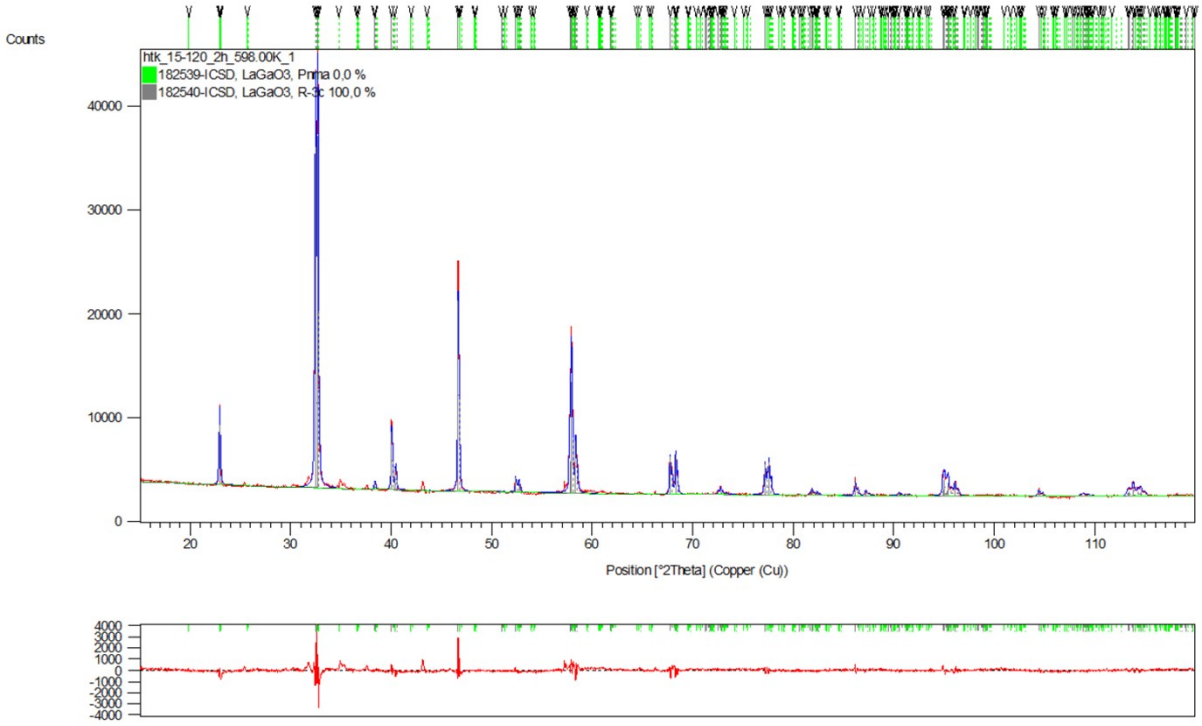

Figure S13. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 598K.

$LaGaO_3$:0.25%Eu^{3+} measured at 623 K

Global Parameters

Number of used phases:	2
Number of variables:	12
Number of constraints:	1
Zero shift/ °2Theta:	0,000000
Specimen displacement/ mm :	-0,236(1)
Profile function:	Pseudo Voigt
Background:	Polynomial
R (expected)/ %:	1,75589
R (profile)/ %:	2,75699

R (weighted profile)/ %:	3,80519
GOF:	4,69635
d-statistic:	0,69920
U standard:	0,000000
V standard:	0,000000
W standard:	0,010000
U Left:	0,000000
V Left:	0,000000
W Left:	0,010000
U Right:	0,000000
V Right:	0,000000
W Right:	0,010000
Asymmetry Type:	No Asymmetry Function
Asymmetry 1:	0,000000
Asymmetry 2:	0,000000
Shape Type:	Shape Individual
Shape 1 Left:	0,600000
Shape 2 Left:	0,000000
Shape 3 Left:	0,000000
Shape 1 Right:	0,600000
Shape 2 Right:	0,000000
Shape 3 Right:	0,000000
K a1/a2 intensity ratio:	0,500000
K alpha/beta intensity ratio:	0,000000
Crystal Shape Factor K:	1,0000
Instrumental FWHM Curve Type:	Caglioti function
Instr. Gauss Curve Coefficient A:	0,0045(5)
Instr. Gauss Curve Coefficient B:	-0,0032(9)
Instr. Gauss Curve Coefficient C:	0,0046(3)
Instr. Lorentz Curve Coefficient A:	0,0062(7)
Instr. Lorentz Curve Coefficient B:	-0,004(1)
Instr. Lorentz Curve Coefficient C:	0,0064(5)

Relevant parameters of 182539-ICSD, LaGaO3, Pnma

Structure and profile data:	
Formula sum:	$La_{3,92}Ga_{4,00}O_{12,00}$
Formula mass/ g/mol:	1015,3820
Density (calculated)/ g/cm^3	7,1552
F(000):	443,4400
Weight fraction/ %:	0,000000
Space group (No.):	P n m a (62)
Lattice parameters:	
a/ A:	5,489476
b/ A:	7,773388
c/ A:	5,521482
alpha/ °:	90
beta/ °:	90
gamma/ °:	90
V/ 10^6 pm^3	235,61170
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,055434
V Left:	-0,002425
W Left:	0,011910
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,537855
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	999,00000

Occupancy, atomic fract. coordinates and Biso for 182539-ICSD, LaGaO3, Pnma

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	4c	0,980000	0,014400	0,250000	0,496700	0,000000
Ga1	4a	1,000000	0,000000	0,000000	0,000000	0,000000

O1	4c	1,000000	0,486000	0,250000	0,568600	0,000000
O2	8d	1,000000	0,273700	0,035200	0,227300	0,000000

Relevant parameters of 182540-ICSD, LaGaO3, R-3c

Structure and profile data:	
Formula sum:	$La_{6,00}Ga_{6,00}O_{18,00}$
Formula mass/ g/mol:	1539,7420
Density (calculated)/ g/cm^3	7,1742
F(000):	672,0000
Weight fraction/ %:	100,0(3)
Space group (No.):	R -3 c (167)
Lattice parameters:	
a/ A:	5,53694(8)
b/ A:	5,53694(8)
c/ A:	13,4213(2)
alpha/ °:	90
beta/ °:	90
gamma/ °:	120
V/ 10^6 pm^3	356,33920
Overall displacement parameter:	0,000000
Extinction:	0,000000
Flat Plate Absorption Correction:	0,000000
Porosity:	0,000000
Roughness:	0,000000
Fitting mode:	Structure Fit
U Left:	0,056(4)
V Left:	-0,036(4)
W Left:	0,021(1)
Preferred orientation direction/ hkl:	0,00 0,00 1,00
Preferred orientation parameter:	1,000000
Asymmetry parameter 1:	0,000000
Asymmetry parameter 2:	0,000000
Peak shape:	
parameter 1 Left:	0,70(1)
parameter 2 Left:	0,000000
parameter 3 Left:	0,000000
R (Bragg)/ %:	1,84712

Occupancy, atomic fract. coordinates and Biso for 182540-ICSD, LaGaO3, R-3c

Atom	Wyck.	s.o.f.	x	y	z	B/ 10^4 pm^2
La1	6a	1,000000	0,000000	0,000000	0,250000	1,070000
Ga1	6b	1,000000	0,000000	0,000000	0,000000	1,070000
O1	18e	1,000000	0,439000	0,000000	0,250000	1,070000

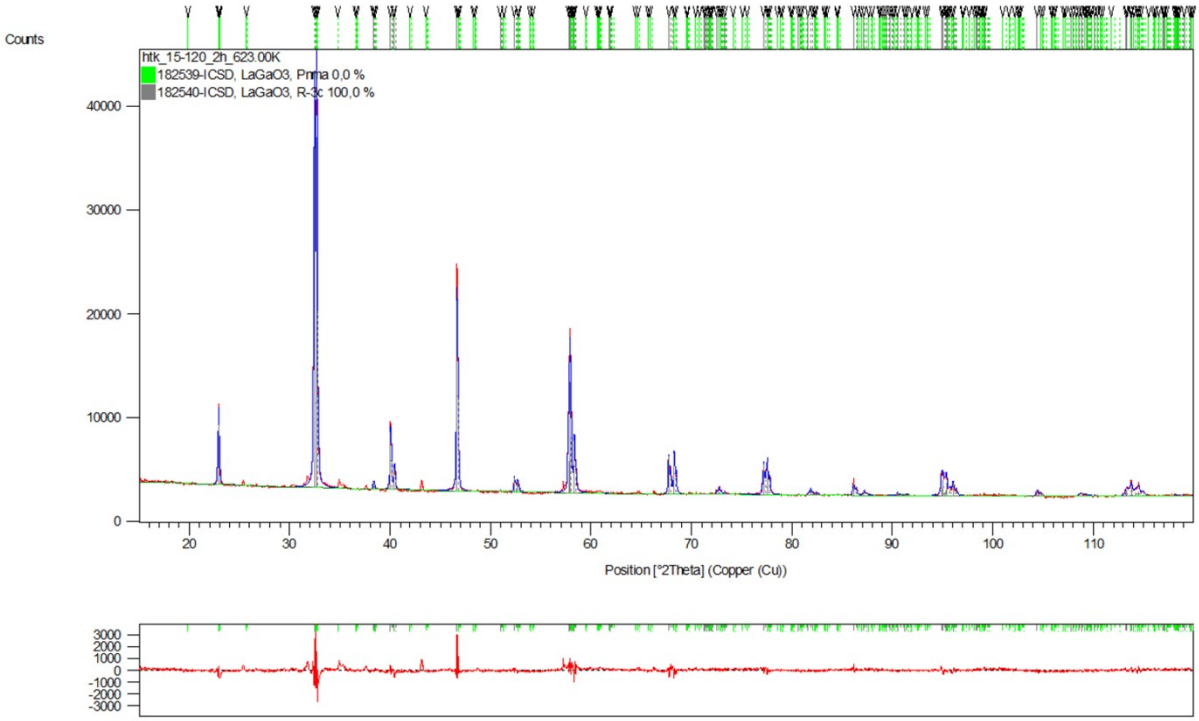

Figure S14. Rietveld refinement of XRD pattern of $LaGaO_3$:0.25%Eu^{3+} measured at 623K.

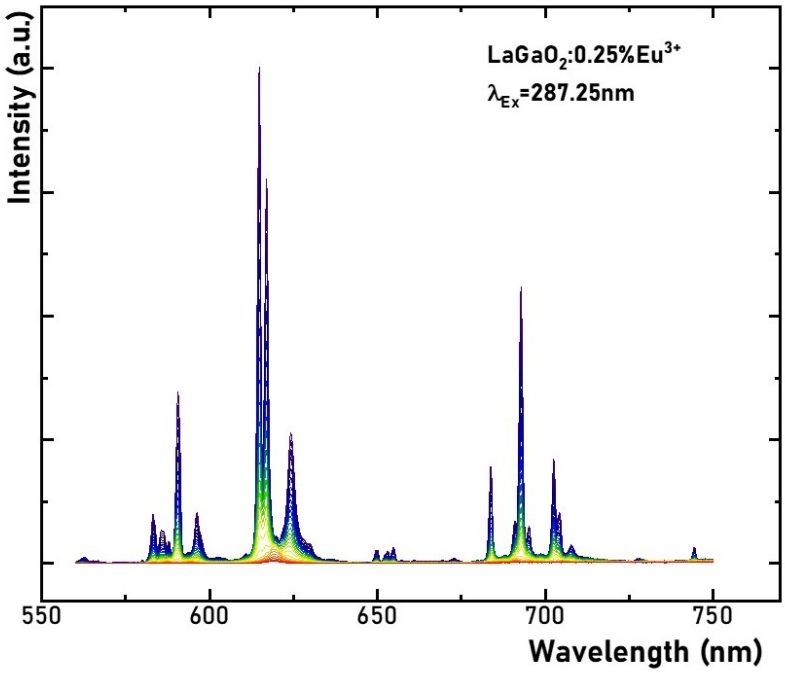

Figure S15. Emission spectra of $LaGaO_3$:0.25%Eu^{3+} measured as a function of temperature.

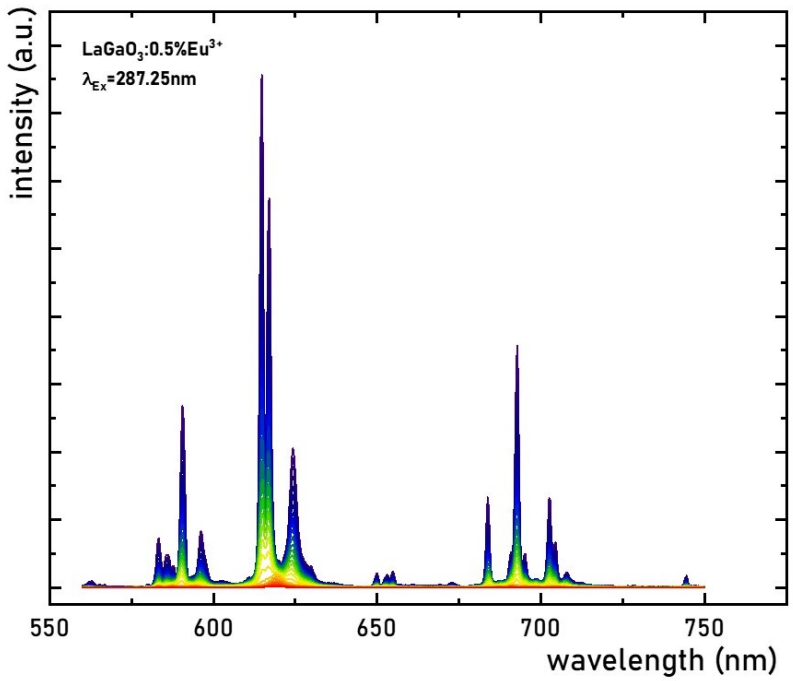

Figure S16. Emission spectra of $LaGaO_3$:0.5%Eu^{3+} measured as a function of temperature.

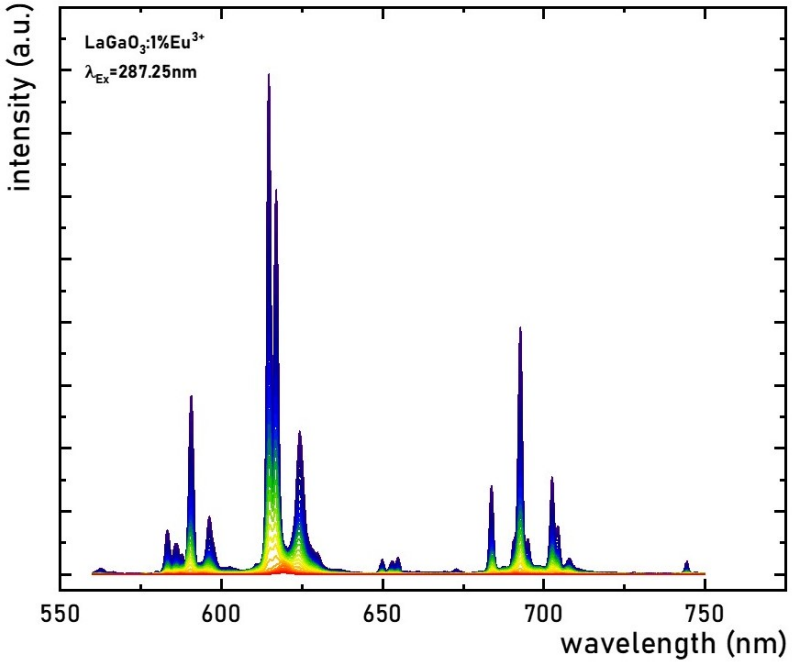

Figure S17. Emission spectra of $LaGaO_3$:1%Eu^{3+} measured as a function of temperature.

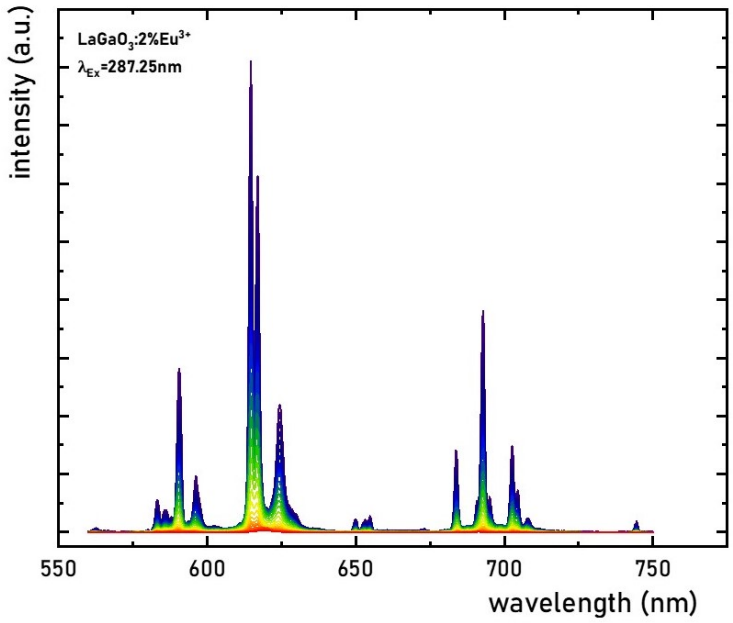

Figure S18. Emission spectra of $LaGaO_3$:2%Eu^{3+} measured as a function of temperature.

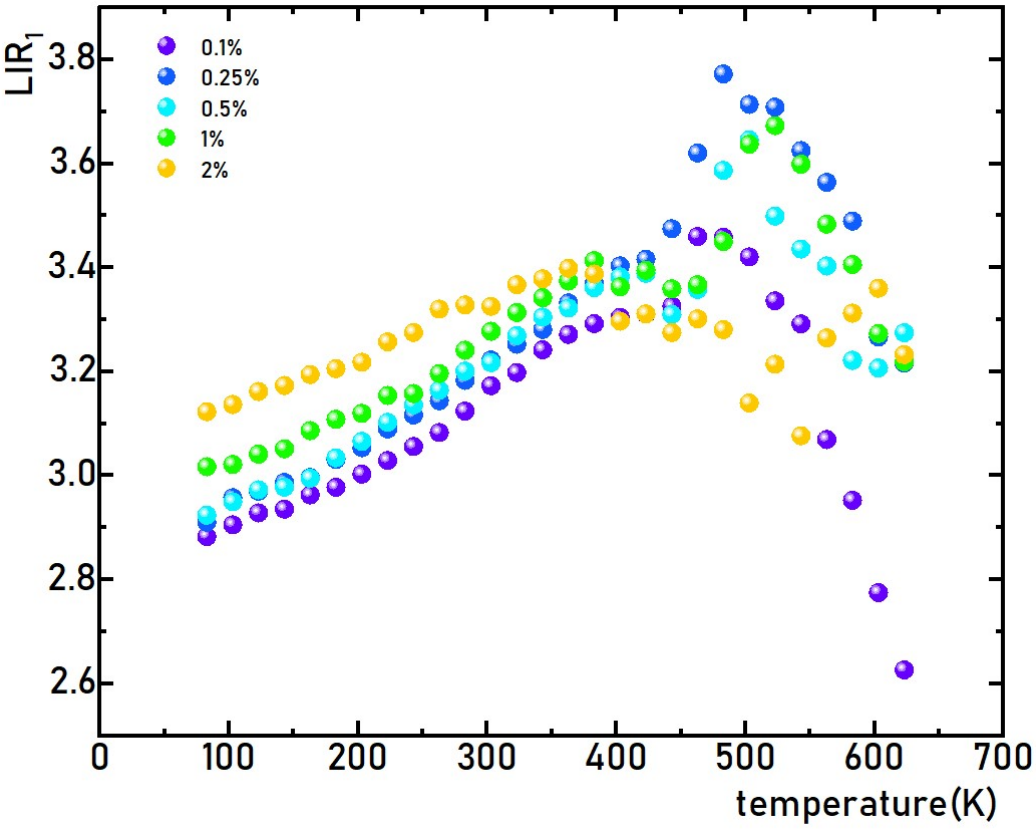

Figure S19. Thermal dependence of LIR_1 measured for different Eu^{3+} concentration.

The δLIR/LIR represents the uncertainty of LIR determination and was calculated as follows:

$$\frac{\delta LIR}{LIR} = \sqrt{\left(\frac{\delta I_{LT}}{I_{LT}}\right)^2 + \left(\frac{\delta I_{HT}}{I_{HT}}\right)^2} \qquad \text{(S1)}$$

where I_{LT} and I_{HT} represents the emission intensity of low temperature and high temperature of $LaGaO_3$: Eu^{3+} (exact spectral ranges presented in equation 3 of the main manuscript). The δI is the uncertainty of the emission intensity determination and was calculated as an integral emission intensity of the baseline (spectral range where no emission of $LaGaO_3$: Eu^{3+} was observed). The δI was determined in the 2nm spectral range.

The average lifetime (τ_{avr}) of the excited levels was calculated based on fit of the luminescence decay profiles by double-exponential function:

$$\tau_{avr} = \frac{A_1\tau_1^{\,2} + A_2\tau_2^{\,2}}{A_1\tau_1 + A_2\tau_2} \qquad \text{(S2)}$$

$$I(t) = I_0 + A_1 \cdot \exp(-\frac{t}{t_1}) + A_2 \cdot \exp(-\frac{t}{t_2}) \qquad \text{(S3)}$$

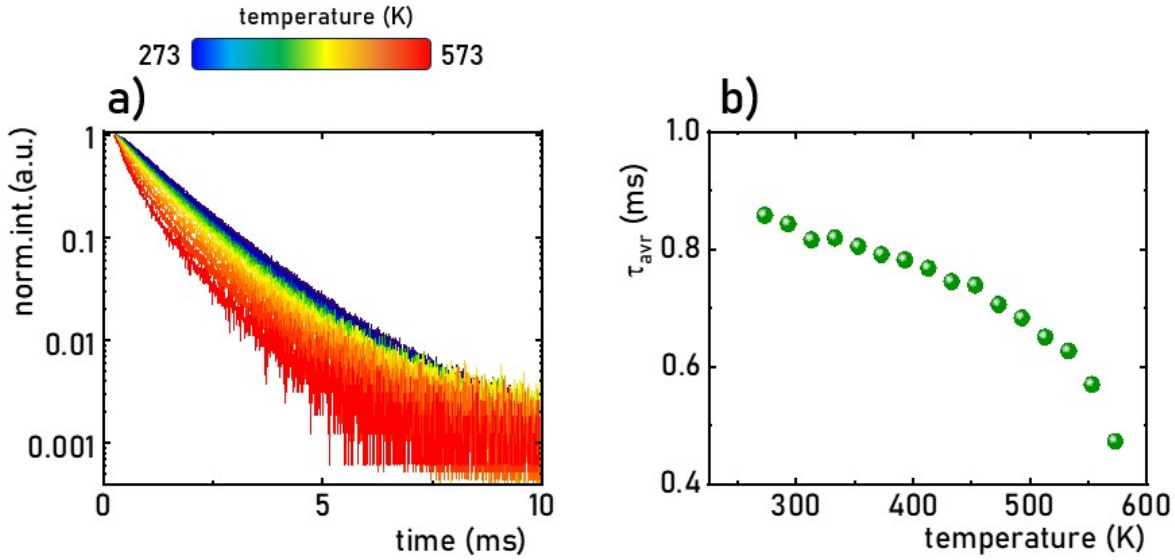

Figure S20. Luminescence decay profile of $LaGaO_3$:0.25%Eu^{3+} measured as a function of temperature -a), and corresponding thermal dependence of τ_{avr}-b).

References:

1. M. Back, E. Trave, J. Ueda, S. Tanabe, *Chemistry of Materials* **2016**, *28*, 8347.